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Drawing by Tech. Sgt. Steele Savage, AAF, from sketch at advance base on New Guinea by Sgt. George Porter.

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Nevertheless, it is a gratifying fact that from its latest zone of operation in the Pacific, comes welcome news that the increased range, the greater speed, and the tremendous punch of this flying Juggernaut is resulting in more missions flown and more victories per mission...both vital factors to the accelerated tempo of our victory drive towards Tokyo.

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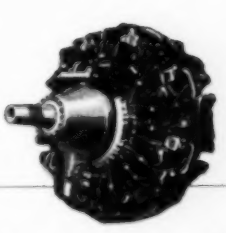

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Revving Up

FLYING BULLDOZER KING: We satisfied an old ambition to learn more about R. G. Le Tourneau, the earth mover whose Lockheeds and heavy church contributions are just as famous as Le Tourneau bulldozers and carryalls. One of his pilots, Jim Matthews, was in town having one of the Le Tourneau planes repaired and we spent a while in Southwest Airmotive's pilot lounge with him and Le Tourneau's brother-in-law, who's been in business with him from the start.

Business men could profit a lot by following Le Tourneau's example of using airplanes in their work. His pilot and associate told us R. G. couldn't attend to all of his enterprises without his Lockheed "12" and Lodestar. He's constantly winging about the country designing, testing and mass-producing special earth moving equipment for the armed forces in war and heavy construction in peace, shuttling between his plants at Peoria, Ill., Vicksburg, Miss., and Toccoa, Ga. His planes rush parts and machinery whenever and wherever needed in a hurry.

For years he has made it possible for his workmen to learn to fly. They draw their hourly wages during the hours they spend at the airport taking instruction, which is available at cost. Some have made quite a record as war pilots.

Oddly enough, Le Tourneau hasn't shown any interest in piloting himself. He spends all his time aloft studying blueprints or sketching designs and specifications for new and bigger earth movers. He took to air travel when his car figured in a head-on collision in which five persons were killed. "He figured it would be safer to fly," his pilot says, "and he's been flying ever since." A belly landing in South Carolina and a nose-over in Canada haven't deterred him; neither has bad weather. But the old talk that R. G. tackles any weather with a strong trust in God and Lockheed isn't so at all. "He hasn't insisted yet," Matthews told us. "When we figure we can't make it without risk, we either land somewhere so he can catch a train or do the old 180-turn and go back."

Le Tourneau is quite a mechanic and a tinkerer, as is obvious from his successful business. But he doesn't tinker with his airplanes. His crew chief, C. A. (Red) McCue, and Southwest Airmotive at Dallas, keep the Le Tourneau fleet in top shape. Heavy stuff is his specialty. Somebody once asked him if he invented the bulldozer, which has had a lot to do with winning this war. His brother-in-law told us R. G.'s answer went something like this: "I don't know, but the one I originated was the first one I ever heard of."

The man who has built some of the world's biggest machines likes to fly as high as possible to utilize tailwind speeds and avoid rough air, which disturbs his blueprint reading. Plans have been made to have the Le Tourneau Lodestar outfitted with oxygen equipment. That way R. G.

(Continued on page 24)

SOUTHERN Flight

Including MODERN AIRPORTS

Twelfth Year of Progress with Aviation

MAY, 1945 VOL. XXIII, NO. 5

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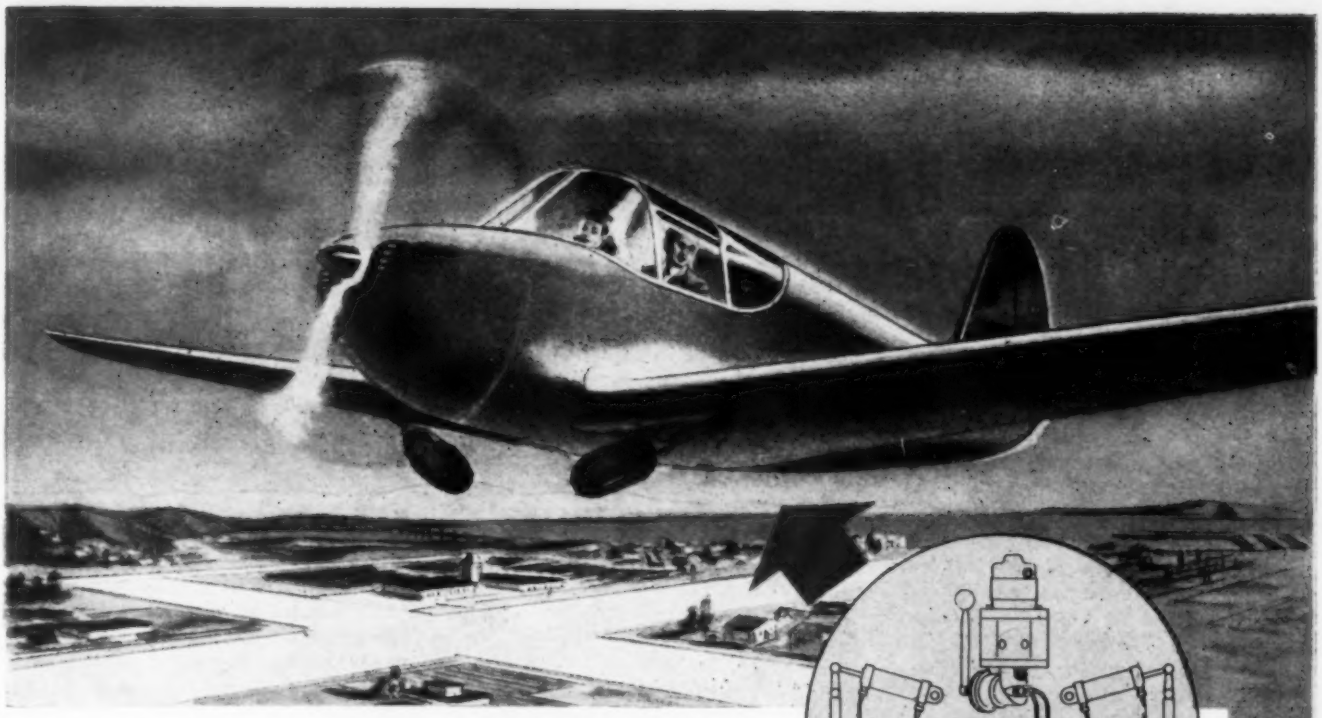

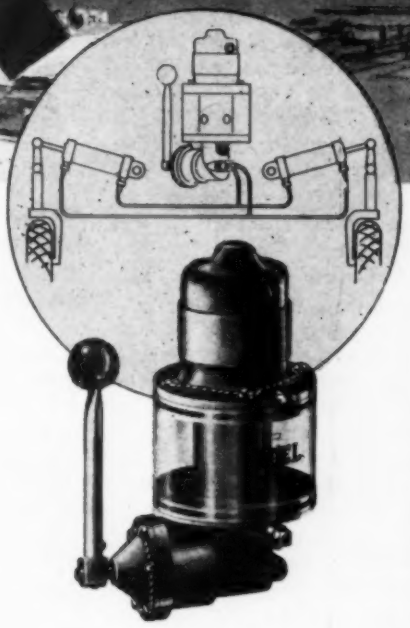

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JUST AMONG OURSELVES

Editorials and Comment

SOLUTION FOR SURPLUS MESS

LAST summer when SOUTHERN FLIGHT sounded a warning that the surplus airplane disposal policies of the Federal Government were liable to create chaotic conditions and undermine the American aviation industry, several government officials and aviation spokesmen took issue with us, retorting there was no basis for our fears. Some of our worthy contemporaries likewise jumped to the defense of surplus disposal policy makers.

These people have had to eat crow. The situation in the disposal of surplus airplanes hasn't improved any and it doesn't appear that it will. Uncle Sam's agencies are just as confused as they were a year ago. They are still milling around in search of new ideas to pawn off a lot of war-weary junk on the American public. Just last month they tried another experiment, spending $42,000 in 740 newspapers advertising surplus trainers "meeting rigid Army and Navy specifications" at prices ranging from $875 to $2,400. Of course they didn't say anything about the airplanes not meeting rigid Civil Aeronautics Administration requirements or that the new owner would have to spend several hundred bucks before he could get CAA certification. This is just one incident in a whole parade of funny business practices the RFC is dealing in but it symbolizes their rank ignorance and confusion.

They admit that the Federal Government is not interested in the economic welfare of the aviation industry. They also state that there is no direct relationship between air safety and surplus disposal—that airplanes are like any other surplus — machine tools, tents, jeeps, ships or what have you. The RFC admits that they want to move as much surplus as possible at a price producing the largest aggregate financial return to the government. We certainly would like our Congressman to find out what it's costing the American taxpayer to handle and market the thousands of junk airplanes sitting around going to pot on thousands of acres of good real estate.

We know that you can get a new idea on how to handle surplus equipment from almost anybody that comes down the street; and furthermore, we certainly don't envy the poor bureaucrats who find themselves bogged down with the puzzle. There is one school of thought recommending that all surplus airplanes be junked for scrap materials; another suggests they be given away to promote a national aviation training program; a third believes they should be sold at a price so they can be moved like the old World War I Jennys. You can even find a few people who agree with the present policy — moving as many airplanes at the highest price you can get no matter what effect it has on the national economy, and let the rest rot.

We also know that there are a limited number of airplanes and a certain amount of surplus aeronautical equipment the present market needs and will absorb. But we've just about reached that saturation point. Why waste the taxpayers' money listing such planes as B-17's, B-24's, AT-6's, several thousand BT-13's and the like?

We conclude that the surplus aircraft problem will solve itself. Limitation Order L-48, prohibiting the manufacture of commercial airplanes, will soon be lifted. When the flying public and the commercial users of airplanes can get new equipment, there won't be much interest in the junk the RFC is trying to foist on the American public. Then, perhaps, the stack piles will grow so high a Congressional investigation will force the Federal agencies to melt the stuff down and store the metal and materials in surplus war factories for possible use in World War III.

Yes, the best possible solution to the surplus mess is to get on with the plans for early production of commercial and civilian models. We now have the facilities and the backlogs. All we need is some intelligent administration and action in Washington.

☆ ☆ ☆

CONGRESS AND AIR TRANSPORT

THE April issue of the George Washington University Law Review contains an unofficial yet highly authoritative opinion that under existing law the President does not have the power to make agreements granting foreign airlines permission to operate in the United States.

This opinion is given by Arne C. Wiprud, special assistant to the Attorney General in charge of transportation cases for the Anti-Trust Division. He was responsible for much of the work on the government's anti-trust suit against the western railroads on charges of conspiracy to fix rates. His opinion, though unofficial, is significant because it was cleared before publication by his Department. He states that executive agreements, to have legal validity, would require the adoption and ratification of a treaty between the governments concerned.

If this opinion is correct, President Truman and the State Department are definitely on the spot with regard to the agreements made at the Chicago Conference, accepted by Roosevelt and declared in effect by the State Department last February.

We cite this instance merely as being symptomatic of the many ramifications, both legal and otherwise, surrounding the whole picture of postwar commercial aviation. It seems to us that such fundamental questions, which always seem to arise after action has been taken, definitely prove our legal machinery lags behind technical development of air transportation. Such frequent occurrences should impress upon Congress and the administration that the Civil Aeronautics Act of 1938 is outmoded and obsolete, no longer capable of adequately fostering and promoting the development of commercial aviation.

A similar dilemma is that faced by our domestic airline operators in the matter of multiple taxation. Readers will remember the famous Northwest Airlines case over a year ago in which the Supreme Court upheld the State of Minnesota in taxing the airline on the basis of 100 per cent of its equipment, although Minnesota is only one of many states served by the operator. It doesn't require a tax wizard or financial genius to figure out what this practice would do to air transportation if the precedent were followed by other states.

It's absolutely incumbent on the

worth waiting for NEWS

No. 2 - WOOD

THE SECOND OF A SERIES OF INFORMATIVE ADVERTISEMENTS ABOUT THE NEW CULVER.
PUBLISHED BY THE CULVER AIRCRAFT CORPORATION, WICHITA 1, KANSAS

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NEW CULVERS WILL BE WOOD CONSTRUCTION—FOR A REASON

"YOU can't improve on nature" is an old saying that holds a lot of water.

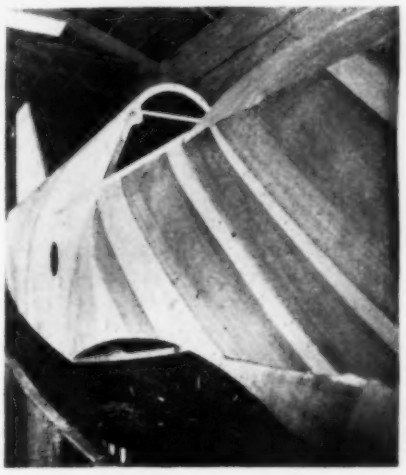
Consider, for example, the black walnut; it has a hard outer shell which is integrated with ribs or sections which internally support and give strength to the hard outer shell. No wonder the phrase becomes common: "He's a tough nut to crack"; for a black walnut is tough to crack.

The reason for using the example of the black walnut is that the New Culver is constructed on nature's principle of the black walnut.

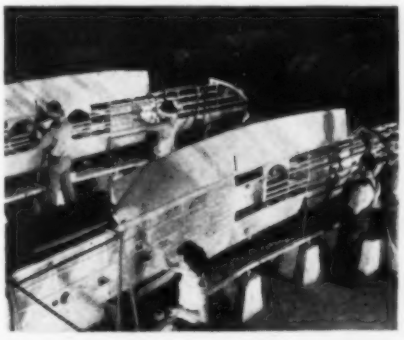
First, airplane grade spruce wood, a product of nature, is the material used for spars, stringers, longerons, and other members which become the sections of support inside the shell. Then plywood, bonded together with plastic resins, forms the stressed skin shell to provide a semi-monocoque construction not too unlike the black walnut principle.

In other words, the product of nature, wood, is integrated with woods and bonded together with plastic resins to form a uniform construction — with the internal strength members becoming a permanent part of the external stressed skin members to combine a structure of common substance which literally grows together providing maximum strength.

Culver has pioneered woods because Culver engineers know that clean lines are easily and inexpensively obtained with woods. There are no rivets to produce drag or weaken the strength of the skin by way of necessary holes punched in it. Culver engineers know that wood is easily and cheaply repaired. Culver engineers know that in a light airplane the weight to strength ratio of wood is a definite weight advantage over metal.



Culver fuselage ready for dipping into a 1700 gallon tank of chemically treated sealer. This sealer provides a protective coat over the wood surface making it impervious to moisture. Such protection adds an exceptionally high degree of permanency to wood airplane construction and makes Culver an all-weather airplane



Here is shown the externally stressed skin wing in different stages of completion. Gas tanks are visible within the framework of the structure. At the left of the wing in the foreground the skin has been applied which is plywood bonded together with plastic resins which form a stressed skin shell providing maximum strength

Comments from Army and Navy personnel who have serviced, maintained, and used Culvers the past three and a half years convince us that the use of woods, as Culver knows how to use them, is sound, practical, economical, and right, for the NEW CULVER.

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Congress of the United States to modernize without further delay all its laws and machinery affecting the administration of both domestic and international aviation affairs. Even if we forget the military, social and economic implications of an expanded, vigorous and sound system of commercial air transport, we cannot shut our eyes to the factors of public convenience and necessity which demand the immediate removal of every obstacle standing in the way of natural growth. It's a responsibility the Congress simply can't continue to dilly-dally with by dealing in half-measures and antediluvian, ground-bound thinking.

☆ ☆ ☆

NEW STRENGTH FOR CAP

THE transfer of Civil Air Patrol to the Army Air Forces Training Command with headquarters at Fort Worth will be completed in May. It's a logical, timely move, especially in view of reduced CAP active duty missions and an increase in CAP Cadet pre-flight training programs throughout the nation. With a forthcoming reduction in the AAF's Cadet training program, the education and indoctrination of American kids in aviation takes on new significance. There is no finer organization than the Civil Air Patrol for this tremendous job. Working in conjunction with our public schools, the CAP is in an ideal position to guarantee a comfortable backlog of aviation cadet material.

Under the direction of the AAF Training Command, the Civil Air Patrol probably will become stronger than at any other time in its history. When CAP was formed late in 1941, it had the unfortunate lot of being attached to the Office of Civilian Defense. Later, the organization became an auxiliary of the Air Forces, and has experienced several different commands within the AAF. Active duty assignments have come and gone until today its active missions are limited to part-time airplane search operations. Every time CAP lost an active duty assignment, or was reshuffled to a new command, the gossip mongers went to work and spread rumors that CAP was through. But somehow, with remarkable self-healing qualities, CAP always managed to emerge from each crisis a stronger organization.

Today, with closer AAF supervision of and greater interest in CAP, we can expect more effective results from this grass-roots, home-town volunteer organization. The national commander, Colonel Earle L. Johnson, can operate with a smaller headquarters staff. The Army can streamline its supervision of CAP units in the field. Whereas all of the group's activities formerly were channeled through CAP national headquarters, military activities of its units are now to be supervised on the spot in each of the forty-eight state wings by AAF liaison officers.

CAP wing commanders are greatly encouraged by the change, expecting more activities to result from the closer ties with the Army Air Forces. One of the first concrete results will be the allocation of 300 surplus primary trainers to replace the smaller liaison planes CAP wings have been using for flight indoctrination. Other similar revitalizing moves are bound to come, promising new laurels to CAP's long list of achievements and unselfish contributions to the successful prosecution of the war and to the health, education and stamina of American youth.

☆ ☆ ☆

VICTORY IN EUROPE

FOR all practical purposes "V-E Day" has arrived, at least for the aviation industry. Changes will start coming hot and fast now that Germany is through.

The long anticipated cutbacks in combat airplane production already have been announced. Others will follow in spite of full steam ahead in the Pacific war. Concentration of all our planning, energy and production on the war against the Nips makes possible a levelling off to more normal operations. Hence, the defeat of Germany is cause for rejoicing, not only because of the end of bloodshed in Europe but also because partial reconversion of American industry is now possible.

Insofar as the aviation industry is concerned "V-E Day" holds special significance. In the first place, the automobile manufacturers will gradually get out of the aviation business (i. e. Ford's Willow Run plant which delivers its last B-24 early in August). Second, our old established aviation manufacturers can return to more efficient operations by throwing out the many incompetents they were forced to hire because of manpower shortages. Third, our industry will be able to start filling commercial orders in a partial reconversion program before Japan is liquidated.

The importance of these three factors cannot be overestimated. They are primary cornerstones in the maintenance of a stable, postwar aviation industry.

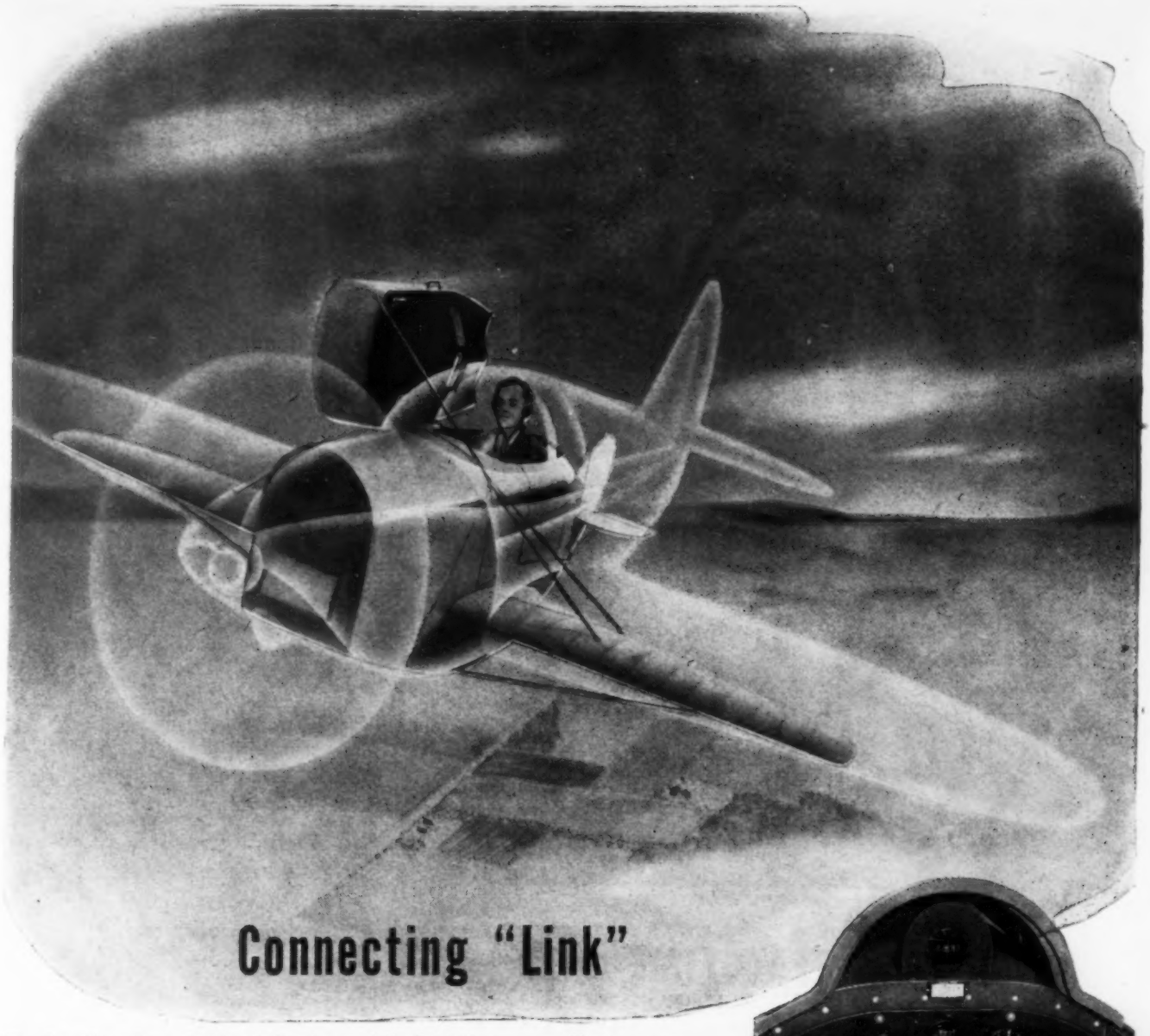
The sigh of relief that comes from the Nazi collapse must not and can not take our attention away from the bloody job still going on in the Pacific. The rising crescendo of American air power against Japan is merely a prelude to what we've got to do in that theater to approximate the all-out air blows we started administering to Germany a little over one year ago. We must remember we haven't reached that comparable stage in the Japanese affair. We must remember, too, that it required better than a year to liquidate the Jerries after achieving *all-out* strategic employment of air power and control of the air over the Nazi fortress. Let's not pause; let's get on with the job.

☆ ☆ ☆

POLICY NEEDED

AT a recent press conference in Washington, sage, realistic Donald W. Douglas, president of the Douglas Aircraft Company, called for a clear statement of policy from the Government on the subject of postwar aviation. Specifically, he asked that the industry be told what the size and structure of our postwar air force will be, how the government intends to insure the continuation of rapid technical development, what steps will be taken to guarantee the maintenance of a strong aircraft manufacturing industry, and what facilities will be maintained as stand-by reserves.

The industry can not make any plans for the future unless it knows what the government is planning. Until the official blueprint is announced, the industry will continue to live on a day-to-day basis, which isn't a very healthy condition in view of the cataclysmic changes that are inescapable during the transitional days ahead. Furthermore, the aviation industry has been heavily penalized throughout the war years because of discriminatory tax laws which would not permit the creation of healthy postwar financial reserves. This fact alone makes a statement of Federal aviation policy mandatory at this time. What most people fail to understand is that although we are the Number One air power nation today, we can slip back to fifth-rate air power overnight. ★ ★ ★



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If you would like information about these instruments — what they are and what they do — write for our booklet "Facts about Kollsman Aircraft Instruments." Address: Kollsman Instrument Division, Square D Company, 80-08 45th Avenue, Elmhurst, New York.

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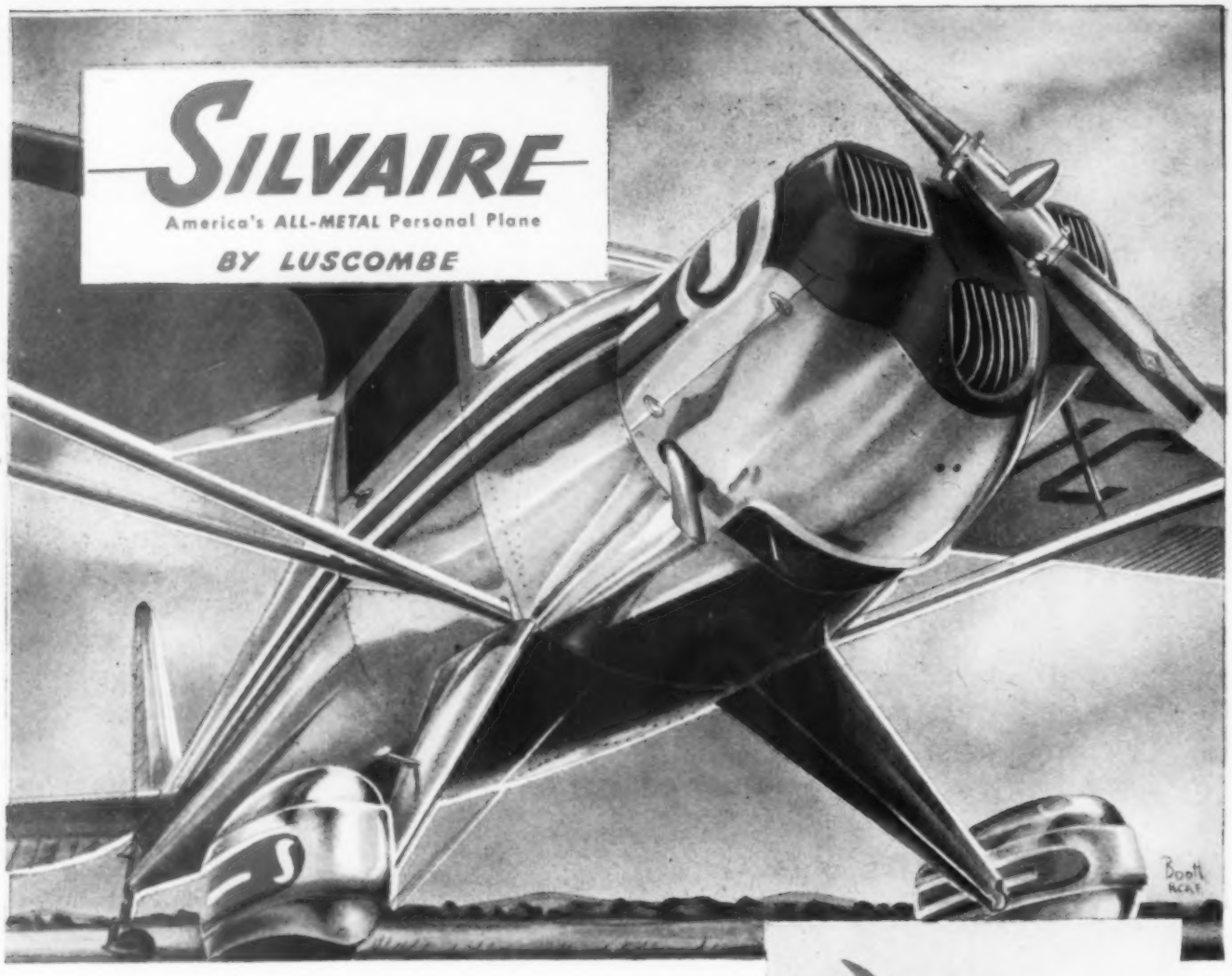

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PIEDMONT AVIATION, INC.....Winston-Salem, N. C.
RICHARDSON AERO SUPPLY, 1245 Miramar Ave., Jacksonville 7, Fla.

GLIDAIR FLYING COLORS

Made by **GLIDDEN** • *Pacemaker in Paints*

PLAN FOR THE FUTURE

All hands at Southern Aircraft Corporation are working on the components for the Liberator, the Avenger, and the Hellcat. From these same hands has unfolded a plan for the future. While they were working for a quick peace in the world they planned for the peacetime world. Just as soon as Victory is won—SOUTHERN will present their experimental work on one of America's newest types of advanced aircraft.

Southern

AIRCRAFT CORPORATION

PLANT IN GARLAND, DALLAS COUNTY, TEXAS

Sets New Standards for DEPENDABILITY *and* ECONOMY

FLYING Curtiss Commandos 10,000,000 miles, largely over water to South America and Africa, Eastern Air Line pilots, operating for Air Transport Command, never missed a scheduled flight because of adverse weather conditions.

That's equal to 400,000,000 passenger miles, but it is only a small portion of the tough war mileage which has tested and proven the Curtiss Commando to make it the most advanced transport available for peacetime air fleets of the world.

World's largest and fastest twin-engine passenger-cargo airplane, the Commando will seat from 36-42 passengers, yet have 526 cubic feet of cargo space to accommodate anticipated 1400% increase over the prewar level in mail and cargo during the immediate postwar years.

With its twin-engine economy, the Commando will produce profits when flying with far less than maximum payload—show greatly accelerated revenue as payloads approach or attain full capacity—is the most economical airplane to operate on flights whose range accounts for more than 90% of all domestic air travel. Curtiss-Wright Corporation, Airplane Division.

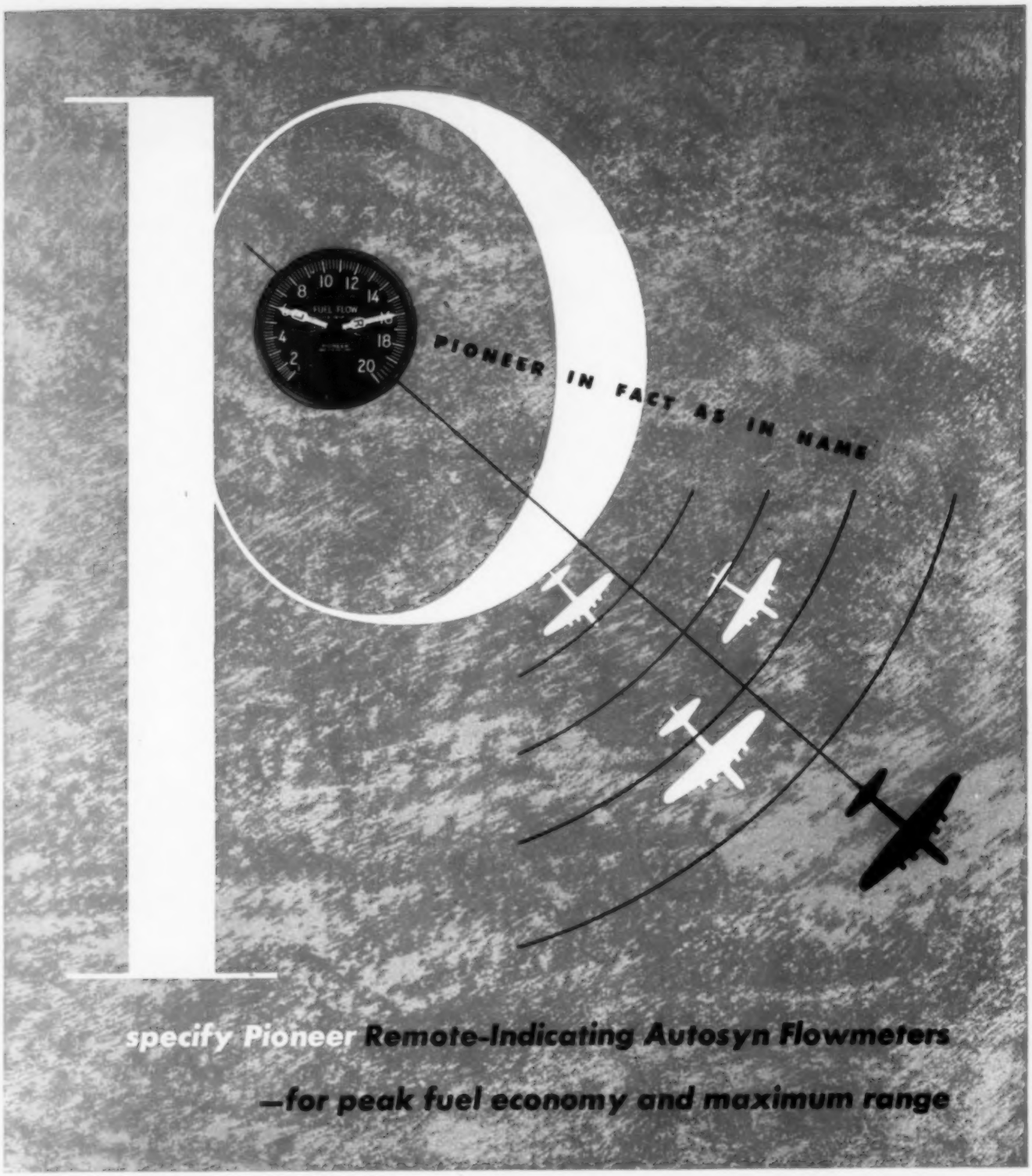
Curtiss Commando

Passed the toughest tests ever given a Transport Plane

U. S. Navy's Grumman Hellcats Return from a Raid

Grumman

AIRCRAFT ENGINEERING CORPORATION, Bethpage, L. I., N. Y.


PIONEER IN FACT AS IN NAME
specify Pioneer Remote-Indicating Autosyn Flowmeters
—for peak fuel economy and maximum range

The Pioneer Autosyn Flowmeter is a remote-indicating instrument of high accuracy and dependability, providing precise indication of the rate of fuel consumption over the entire range. It enables the operator to hold the engines to predetermined consumption rates for optimum power plant efficiency, and adds to flight security by accurately foretelling flight range. Tests at altitudes up to 35,000 feet, and over extreme temperature ranges, show no appreciable errors in indication. Advanced design holds pressure drop extremely low—less than 1 psi drop over the entire operating range. (Complete specifications and data may be obtained by writing to the address below.)

PIONEER INSTRUMENTS
ECLIPSE-PIONEER DIVISION
Teterboro, N. J.

Bendix
AVIATION CORPORATION

Bendix, Pioneer, and Autosyn are trade-marks of Bendix Aviation Corporation

Stop Hunting Around

FOR AIRCRAFT
AND ENGINE PARTS
ACCESSORIES

Come and get 'em

We've got everything to "Keep YOU Flying"—complete stocks of Aircraft and Engine Parts, Radios, Instruments and Pilot Equipment. The fellows who KNOW try AIRCRAFT SALES —FIRST!

Like the wise old owl—the birds who have been flying longest, know Aircraft Maintenance and Repair is OUR BUSINESS. Whether your airplane needs only simple repairs, or a complete overhaul—here, over twenty years experience, gives us the KNOW HOW to get the job done RIGHT!

PIPER CUB · LYCOMING · CONTINENTAL MOTORS · MIMAX-LAVAX · CHAMPION · Stinson · BENDIX SCINTILLA · ZYGLO MAGNA-FLUX · Fairchild · AIR WING · AMERICAN · Franklin

AIRCRAFT SALES CO.

MEACHAM FIELD FORT WORTH, TEXAS

AIR REPORT

SIGNIFICANT TRENDS IN THE NEWS

Green Light Awaited for Civilian Output

Revocation of WPB order L-48 to allow early conversion for the manufacture of light civilian airplanes was expected early in May, and several firms were looking forward to new plane deliveries during the summer. Full production will take longer, but a start can be made by using stocks of parts and components which have been built up gradually in recent months. Materials will be controlled by government regulations during the transition, and labor acquisitions will have to be cleared with government agencies. Complicating factors include completion of arrangements by manufacturers to use government-owned property such as tools and machines.

★ ★ ★

AAF Orders Training Cutback

Following orders from Army Air Forces' headquarters calling for a drastic cutback in the aviation cadet program, Lt. Gen. Barton K. Yount, in charge of the AAF Training Command, said it is a "reasonable assumption" that aviation students already in flight training should be sufficient to meet all needs not only for pilots but for air crewmen such as bombardiers and navigators. Diversion of pre-aviation cadets and students to other assignments will result, and General H. H. Arnold has notified all Air Corps Enlisted Reservists that the opportunity to qualify as aviation cadets no longer is available to them. In addition, AAFTC this summer will terminate primary training contracts at nine remaining civilian flight schools.

From the beginning of 1939, through March, 1945, and principally in the last three years, AAFTC graduated 224,331 pilots, 46,121 navigators, 42,098 bombardiers and 282,836 aerial gunners. In addition, prospective air and ground crew members completed 839,764 basic courses in technical subjects.

★ ★ ★

B-32 to Make Bow

The Army Air Forces' newest very heavy bomber may be revealed in the public press soon. It is the B-32 Dominator, stablemate of the B-29. In production for some time at Consolidated Vultee's Fort Worth plant, which discontinued B-24 output months ago, the Dominator will have several features reflecting improvements over the older and more hurriedly-produced B-29's. Production facts about the long-distance heavyweight have been published for several months, but performance and descriptive matter remains unmentionable.

★ ★ ★

Solution for Aluminum Scrap Reclamation

The Aluminum Ore Company, ALCOA subsidiary, working with the Air Technical Service Command and the Redistribution and Salvage Office of the Army Air Forces, has developed a chemical process for salvaging scrap aluminum. Previously, it was necessary to sort out other materials in scrap or surplus airplanes and melt down the aluminum. Much metal thus obtained was of limited value because it was a mixture of aluminum alloys, contaminated by foreign metals that could not be removed by commercial sorting methods. With the new process, surplus or war weary airplanes are introduced into a bath

Looking Ahead with LEAR

The new Voyager 125, Stinson's contribution toward America's postwar private flying — 4 place with a cruising speed of 115 mph.

What is America's private plane going to look like? This is Stinson's answer—a sleek, serviceable successor to the rugged, hard-working "Flying Jeep" used by the Army as an observation and ambulance plane.

As with other postwar planes, the radio in this Stinson Voyager is a Lear Radio. For Stinson knows from experience that this is a dependable radio—a radio made for airmen by airmen.

This is what Stinson has to say about Lear Radios:

"In the past years we have been installing a large number of Lear Radios in our Reliant and Voyager planes and have always found them to be satisfactory in every respect."

Lear has been making outstandingly fine radio instruments and direction-finding equipment since 1930. And these instruments have won a reputation for their light weight, sensitivity and complete dependability.

LEAR, INCORPORATED — Radio Division: Grand Rapids 2, Michigan · Aircraft Radio Sales: 1860 Broadway, New York 23, New York · West Coast Subsidiary: Lear, Inc. of Calif., 1010 N. Highland Ave., Los Angeles 38, Calif.

Formerly Lear Avia, Inc.

Lear INCORPORATED

IRVIN AirChute

"SINGLE-RELEASE" Harness

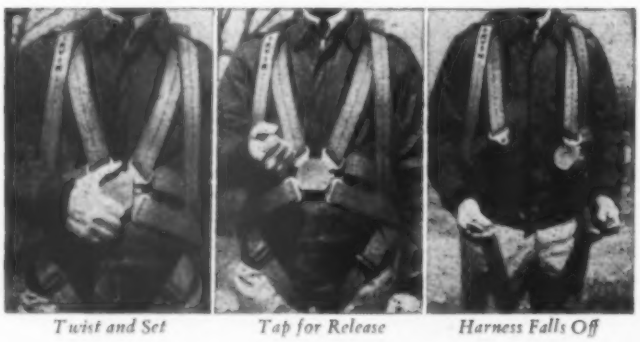
UNITED NATIONS' FLYERS

are using it for

SAFER LANDINGS

A one-hand turn and a tap on the single frontal disk instantly releases the harness . . . leaving the flyer entirely free. Accidental release is impossible before disk is "set" for action.

All United Nations' Air Forces for years have used IRVIN as standard equipment . . . and now the Irvin "Single-Release" harness is acknowledged as superior for all landings. IRVIN, as always, leads in Safety.



Twist and Set *Tap for Release* *Harness Falls Off*

IRVING AIR CHUTE CO., Inc.

Main Office: 1670 Jefferson Ave., Buffalo 8, N. Y.

Complete Factories in Buffalo, N. Y., Glendale, Calif. (1500 Flower St.), and Lexington, Ky., U. S. A. . . . Canada, England and Sweden . . . All Serving the United Nations' Air Forces.

BUY MORE WAR BONDS

of caustic soda, which dissolves the aluminum while all other metals including aluminum alloys remain in solid form. The scrapped plane is thus taken apart chemically instead of by tedious and costly hand labor. Not only does this method convert scrap aluminum into new aluminum, thereby preserving the nation's high-grade bauxite reserves, but offers a practical and economical solution for salvaging obsolete planes and removing surplus junk from the market.

★ ★ ★

CAA Shakeup Expected

An old wound within the CAA may be opening up after superficial healing during the war years. Informed sources in Washington believe Administrator T. P. Wright soon will announce major department head changes in order to eliminate certain members of the old guard who aren't in sympathy with his more liberal and progressive program for streamlining regulations and functions of the CAA.

★ ★ ★

Airlines Need Heavy Financing

A prediction that U. S. Airlines will require new financing amounting to $500,000,000 during the next five years has launched an intensive study of airline financing methods by the nation's lending institutions. The prediction was contained in a report covering a survey made jointly by Bankers Trust Company, the Mutual Life Insurance Company, the Chase National Bank and the New York Trust Company, with supervision by Gordon D. Brown, aviation consultant. In outlining the financing problems involved, the report indicates that by 1950 our domestic airlines will probably fly some eight billion passenger miles annually, as compared with one and six-tenths billion in 1943. The survey indicates that in order to handle such volume domestic carriers will need equipment with approximately five times the seating capacity of their existing fleet, and this will require $300,000,000 expenditures for flying equipment and spare parts and over $100,000,000 expenditures for non-flying equipment.

In addition, the survey indicated U. S. carriers operating internationally will spend another $250,000,000 on foreign operations. Of the grand total, $500,000,000 will have to be raised by borrowing or through sales of securities, the survey predicted.

★ ★ ★

Looking Ahead

If Howard Hughes' monster all-wood flying boat were placed inside a football stadium, its wings would extend over the goal posts. It's rumored that Hughes has already invested more than $22,000,000 in the project. . . . Two prewar manufacturers of medium sized personal type airplanes are ready to go with production of highly improved, four-place, single-engine, speedy cabin jobs in the five to ten thousand dollar class. . . . Piper says it's possible to go into immediate production and deliver the new J-3 Cub (with fifteen major improvements) and the 100-horsepower Cub Cruiser. Their four-place low-wing job will be available next year if, as and when the military services release engineering and experimental departments from war work. If WPB restricts personal plane production, OPA ceiling prices will prevail. On the other hand, if Piper can produce 250 ships or more per month prices will drop largely because new and improved tooling will compensate for higher labor costs. . . . Bellanca is pushing establishment of an expanded dealer and distributor organization on a national scale in preparation for early production and sale of its new models. . . . . Essair, new Texas airline established by a three-year "temporary" certificate of convenience and necessity late in 1943, is expected to start operation between Amarillo and Houston, Texas, within sixty days. Due to delay in getting started, the CAB has ruled that Essair "will have ample opportunity to apply for an extension of time so that operations may cover a full three-year period" instead of expiring on December 31, 1946. ★ ★ ★

LANDING GEAR . . .

tough as steel, soft as air!

Heat treated, alloy steel gives Aerols* super strength to withstand the terrific impact of landings. Yet their rugged cylinders are filled with soft, resilient air which, together with oil, effectively cushions and absorbs the landing shock.

Pioneered and perfected by Cleveland Pneumatic almost 20 years ago, Aerols are an *established* aircraft advancement — their reliability has been *proved* on every size of plane, in every climate, on every terrain.

Illustrated is the Curtiss C-46 Commando, a leading military transport plane destined for wide postwar commercial use.

THE CLEVELAND PNEUMATIC TOOL CO.

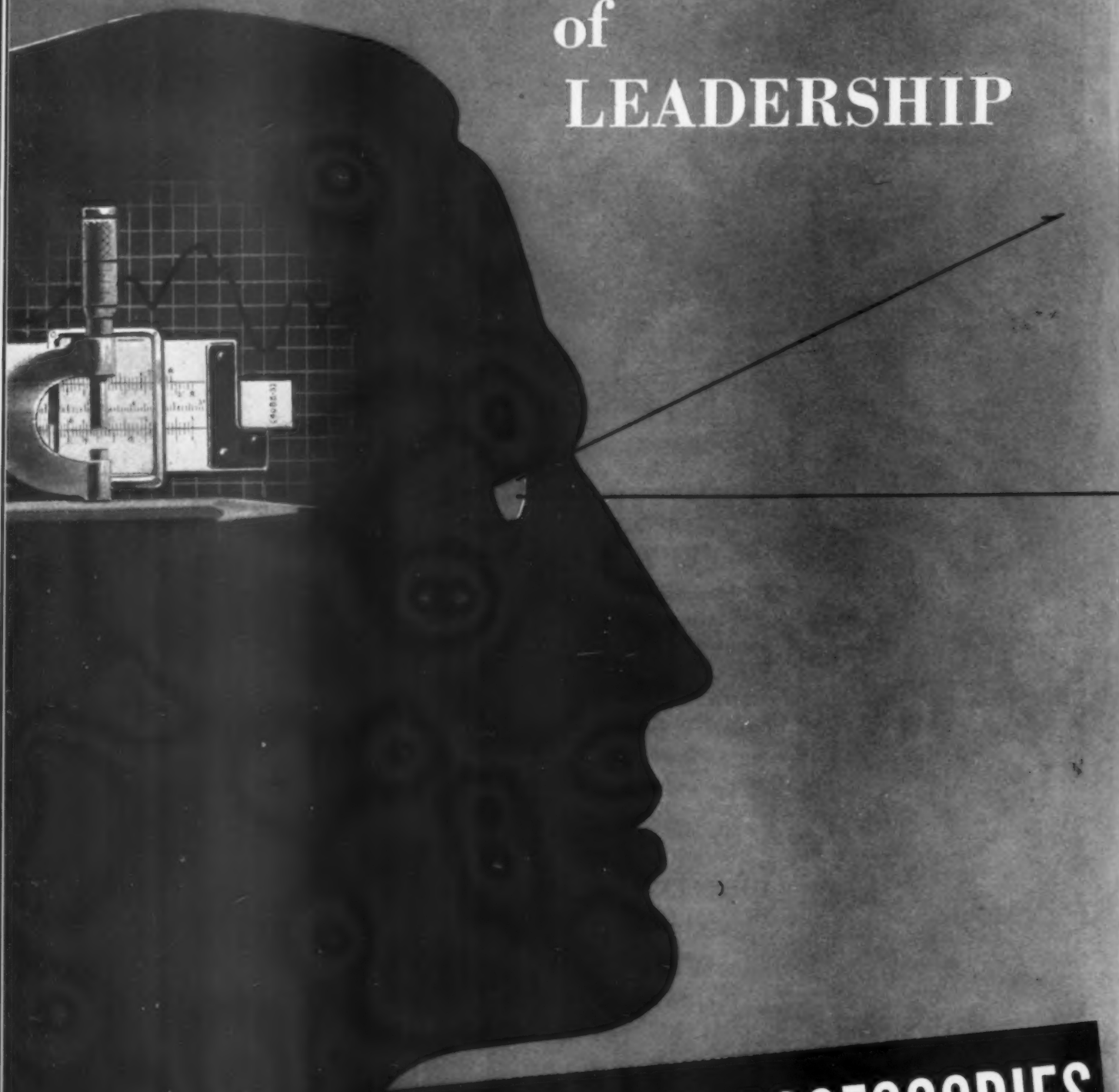
AIRCRAFT DIVISION • CLEVELAND 5, OHIO

Help Finish the Fight! Buy MORE War Bonds and Stamps!

AEROLS*

*PNEUMATIC-HYDRAULIC (AIR-OIL) SHOCK ABSORBING LANDING GEAR

Background of LEADERSHIP



Eclipse AVIATION ACCESSORIES

Eclipse-Pioneer Division • Teterboro, N. J. • Los Angeles 36, Calif.

continuous practical research assures airborne accessories in step with advancements in plane design

From the early days of aviation, Eclipse engineers have led in unremitting research for better airborne aviation accessories.

Recognizing that there is no such thing as perfection, Eclipse engineers, men of vision mated with practical know-how, have constantly improved their products and are daily solving new and difficult aviation accessory problems.

Design-proven by continuous practical experience . . . Test-proven by modern methods and finest facilities . . . and finally Flight-proven under the most exacting conditions, Eclipse Aviation Accessories emerge as the finest in use today.

We have the men and the means—let us work with you on today's needs and tomorrow's problems.

BENDIX AND ECLIPSE ARE TRADE-MARKS FOR BENDIX AVIATION CORPORATION

EVERY ACCESSORY ANY PLANE NEEDS—ENGINEERED AND BUILT WITH ECLIPSE CRAFTSMANSHIP

KEEP AMERICA STRONG . . . BUY MORE WAR BONDS

Bendix
AVIATION CORPORATION

The Birdmen's Perch

By *Major Al Williams*, ALIAS, "TATTERED WING TIPS"
Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh 30, Pa.

THE FOLLOWING WAS CLASSIFIED AS TOP SECRET!

But in line with our policy of keeping Perch Pilots the best informed group in Aviation, we got permission to break security and tell all.

It's about that new su-hooper, 6-engine Consolidated Vultee job which will weigh 320,000 pounds, have a wing span equal to the height of a 21-story building, and an overall length to match!

Here's the inside story:

This plane is to have at least 2 navigators! There will be one in the nose and one in the tail! You see, the plane's so long, that it will be necessary to file two ETA's . . . one for each end of the ship!

Sh-h-h!

**THE BIGGER THEY ARE—
THE FARTHER THEY HAUL!**

But wait . . .

Before you can make planes as big as the one we just told you about, you've gotta make engines "big" enough in performance to lift 'em!

And before you can make engines that'll give you that kind of performance, you've got to have a thousand other things that will live up to the high performance standards of the engine—high performance spark plugs, pistons, metal alloys.

And of course you have to have high performance fuels and lubricants! Like that Gulf Aviation Gasoline and Gulfpride Oil.

Gulfpride is the only oil refined by the Alchlor Process, which is an extra step in extracting the trouble-making fractions from crude oil. And when we say "trouble-making" we mean the parts of raw oil which quickly break down into carbon and sludge.

Our "extra step," the Alchlor Process, gets extra amounts of these engine killers out of Gulfpride, so that Gulfpride gives high performance lubrication.

And high performance lubrication makes high performance engines possible.

LITTLE KNOWN FACTS DEPT.

Remember when we opened up the Little Known Facts About Well Known Planes Dept.?

We promised to commission you a Perch Pilot (bottom rung) if you sent us a "Fact" we could use. We also promised to promote you to Senior Perch Pilot after we'd run *five* of your "Facts."

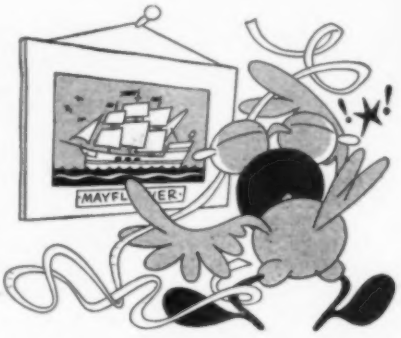
Well, Perch Pilot (br) Perry Young of Refugio, Texas, becomes the first candidate for promotion with the following item, his second to run:

"Since the first B-26 rolled off the line, its wing span has increased 6 feet and its tail has doubled in area!"

Here's another one from George R. Clay of 2919 Royer Place, Dallas, Texas (*who sent proof, too*):

"The P-51 is manufactured with fewer man hours than its assembly line mate, the AT-6!"

And peel our paint if we aren't going to commission another girl, this month! Her name's Helen Birnie of Western Air Lines, Inc., Los Angeles 14, Cal.



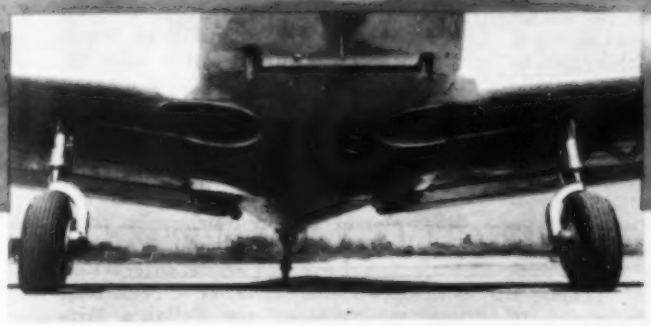
"The span of a Superfortress is greater than the overall length of the original 'Mayflower'!"

Make yourselves at home, Perch Pilots—your commissions are on the way. Receipt of your commission, incidentally, entitles you to purchase an extra War Bond this month!

Gulf Oil Corporation and Gulf Refining Company...makers of

GULF **GULF AVIATION PRODUCTS**

OIL IS AMMUNITION—USE IT WISELY



Wide (7′ 6″) tread and the large wheels and 6.00x6 tires give exceptional ground stability. The new type hydraulic brakes are designed for quick, low cost servicing without removing wheels.

Enjoy the Safety of the *Swifts*

Hydraulic Retractable Landing Gear...

Choose the economical new ***Swift*** for your personal plane and enjoy the advantage of big-plane features . . . one of which is hydraulic retractable landing gear, sturdily built and designed with ***three*** safety features: (1) red and green lights on instrument panel indicating position of each wheel, (2) auxiliary manual mechanism for lowering wheels, (3) spring loaded pins that automatically lock wheels in down position.

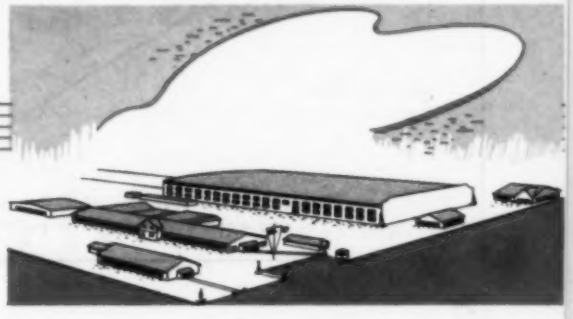
Struts are hydraulic with steel cushioning springs . . . and long enough and at sufficient angle to throw the wheels well forward with weight on the sturdy tail wheel . . . giving extra stability in landing on rough ground or when brakes are applied quickly. Standard size 6.00 x 6 airplane tires help make landings safe and comfortable . . . and the extra sturdy shock-strut tail wheel, a special ***Swift*** feature, makes smooth landings easier and helps the ***Swift*** taxi smoothly.

You'll be proud of your ***Swift*** and you won't be satisfied with a plane that offers you less than the ***Swift's*** many advantages. The ***Swift*** will be ready soon after conditions permit the manufacture of personal airplanes.

The Swift

Made by GLOBE AIRCRAFT CORPORATION Fort Worth, Texas

Illustrated booklet sent on request. Write to P.O. Box 4277-F Fort Worth 6, Texas



REVVING UP

(Continued from page 4)

can get a little higher with his earth-moving study.

★ ★ ★

WELL-EARNED PROMOTION: Hard-working John E. P. Morgan, who has continued plugging for the light-plane manufacturers throughout the war, has been elected executive director of the Aeronautical Chamber of Commerce. He has been serving as chairman of the Chamber's management committee and has directed the Chamber's Personal Aircraft Council, for which a successor will be named soon. The ACCA is expected to be renamed soon. "Aircraft Industries of America" has been recommended as the new name by its board of governors and is being voted on by the membership.

★ ★ ★

P-38 AS HIGH-LEVEL BOMBER: One of the air war's best-kept secrets was a modified P-38 with a plexiglass nose, a bombardier and a Norden bombsight. Both the 8th and 9th Air Forces used the trick with much success. A "droop-snoot," as the two-man Lightning is known, would ride inside a large formation of P-38's, each carrying 4,000 pounds of bombs. After passing German fighters, whose pilots preferred to await B-17 formations to make their attacks, the "Droop-Snoot" would assume the lead position and its bombardier line up the target, over which an ingenious device allowed him to release the entire formation's bombload simultaneously. Lockheed originated the idea and Lt. Gen. James Doolittle requested the modification be put on a production basis.

★ ★ ★

CASTERED LANDING GEAR REVIVED: A CAA request for funds to finance research and development of full-swiveling landing gear, cut from the Department of Commerce appropriation bill in the House, has been reinstated in the Senate, and plans call for revival of the cross-wind landing gear program this summer. John Geisse, assistant to CAA Administrator T. P. Wright, said several manufacturers will be asked to tackle the problem.

★ ★ ★

NEW LIAISON PLANE: A four-place Piper liaison airplane, designated L-14, is to be produced in quantity as a cargo-ambulance ship. It is powered by a 125-hp. Lycoming engine.

★ ★ ★

SHORT SNORTS: Bell Aircraft's Arthur L. Fornoff says that tests with the P-59 Airacomet in Alaska prove that JP means an end to most of the cold weather problems associated with conventional airplanes. Engine heating before take-off is unnecessary, ground maintenance simplified, and increased oxygen from cold air means increase in thrust from the jet engines, making for shorter, faster take-offs and increased speed at lower altitudes. No props or carburetors to ice and heat can be ducted from the tail pipe to the wing area to prevent wing icing. . . . Vice Admiral Emory S. Land, maritime commission chairman, admits airlines will carry the cream of transoceanic passeger business after the war but contends cargo will still go by water. He also said he thought aviation promoters were suffering from delusions of grandeur when they talked of flying people to London for $100.

A confidential draft of a national airport construction bill has been prepared by the Senate Commerce Committee adjusting differences in policy which developed during public hearings on the six major bills now pending. It sets up a $3 million fund at once for preliminary planning and surveys by the CAA, who would administer the program. Meanwhile, due to lack of funds, a large number of CAA airport service personnel are being forced to look elsewhere for jobs. . . . The Aeronautical Training Society recently pointed out that thousands of veterans of the Army Air Forces will not be able to obtain the type of retraining needed to enable them to continue careers as pilots in modern air transport because of policy restrictions in the G. I. Bill of Rights. The $500 tuition allowance for a school year of 30 to 38 weeks of a minimum of 25 hours are virtually valueless to veteran pilots, according to the ATS. What's needed is shorter specialized courses with somewhat higher weekly allowances for tuition and expenses.

In an address before the New York chapter of the Aviation Writers Association last month, John L. Cohill, president of Firestone Aircraft Company, announced that his company would retire from aircraft production with the exception of such accessories as tires, wheels, brakes, cables, insulating units, etc. He believes that postwar civilian aircraft production will probably not exceed 2 or 3 per cent of present output of the industry. . . . The good old RFC, now making news with its methods of disposing of surplus airplanes, announces it is going into the used parts business. Plane owners and others interested in purchasing aircraft parts from the RFC should get in touch with their Surplus Aircraft Division, Washington. . . . Look for some interesting announcements shortly regarding postwar plans of the Bellanca Aircraft Corporation, whose annual report contained items to the effect that they were looking to the creation of the 1946 model of the "Cruisair" and that an effective distributor and dealer organization will be set up within the next few months . . . As predicted by SOUTHERN FLIGHT last year, an unprecedented flood of state aviation legislation has hit the legislatures of more than thirty states. Airmen are now more convinced than ever that it's absolutely impossible to ever achieve uniform state aviation legislation—for no two of the states have yet enacted the same law!

★ ★ ★

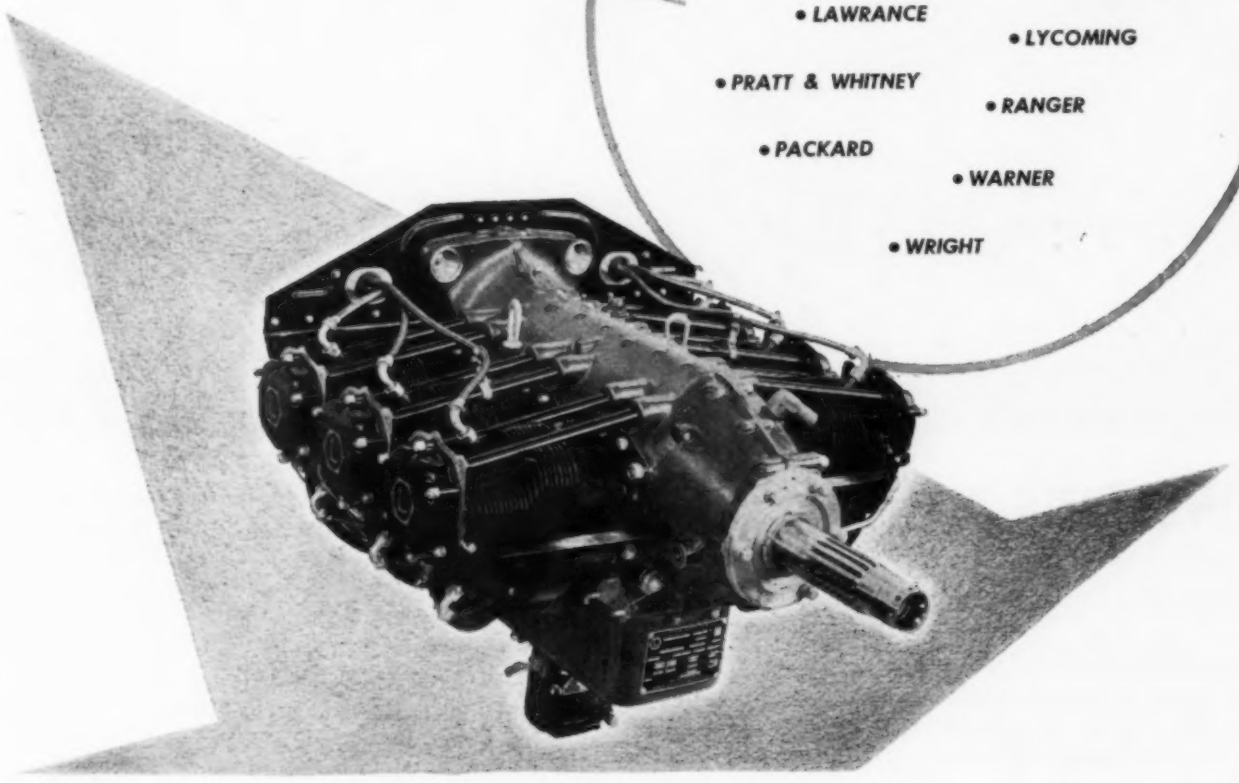
AVIATION SEMINARS POPULAR: Oliver L. Parks says there has been so much interest in the new Parks Air College aviation seminars for business men that he will continue the special courses during the summer. The seminar course includes studies of fixed-base operations, airlines, building of airparks and their operation, and other subjects. Complete costs of the five-day course, during which the matriculant lives on the Parks campus, are only $37.50 including meals, room and books. Details can be had from Frank Maher, Parks Air College, East St. Louis, Ill.

—Lt. Joe James.

"Came in here just like this for a landing the other day and darn near forgot to put the wheels down!"

Scintilla "sparks" the finest

- FRANKLIN AIRCOOLED
- KINNER
- CONTINENTAL
- JACOBS
- LAWRANCE
- LYCOMING
- PRATT & WHITNEY
- RANGER
- PACKARD
- WARNER
- WRIGHT



Lycoming Aircraft Engines **. . . first lesson in dependability for thousands of air cadets—** Chosen to power large numbers of Uncle Sam's finest training planes, Lycoming Aircraft Engines are giving thousands of air cadets their first lesson in dependability . . . as Bendix-Scintilla Aircraft Ignition equipment delivers the vital spark.

SCINTILLA MAGNETO

BENDIX-SCINTILLA AND SCINTILLA ARE TRADE-MARKS OF BENDIX AVIATION CORPORATION

ARMY E NAVY

DIVISION OF **Bendix** AVIATION CORPORATION
SIDNEY, N. Y.

Stinson
—tuning up for an important take-off

PIONEERING When the first Stinson plane took to the air, back in 1926, it was a plane ahead of its day.

The world had never before seen a plane that combined in its design an enclosed cabin, wheel brakes, electric starter, and a cabin heater.

Into this new plane "Eddie" Stinson had also built another important "first"—an inherent stability that has been a characteristic of every Stinson plane built in the intervening years.

Constant improvements in design and performance have enabled Stinson planes to show an enviable record of performance in the 19 years of Stinson history.

Stinson "Firsts"

FIRST to fly from Detroit to Tokyo.
FIRST to fly from New York to Bermuda.
FIRST to carry government air mail in China.
FIRST to carry government mail in Mexico . . . and in the Philippines.
FIRST to explore the Greenland route to Europe, the present-day route of the North Atlantic Air Ferry.
FIRST to provide air-mail pick-up service.

PROVED IN WAR On fighting fronts around the globe, liaison planes built by Stinson are again proving their utility and reliability—this time under the toughest flying conditions ever met by planes of this size and power.

Marines call for "air eyes" to help them push forward on a hard-won beachhead. So a Stinson "Flying Jeep" —the Sentinel L-5—scurries across the deck of a carrier to take the air and land in the midst of battle on a shell-pitted air-strip.

Medical corpsmen urgently need transportation for desperately wounded men lying in a field rimmed by mortar fire. And Stinson "Flying Jeeps" land alongside to take them swiftly and surely to the rear.

Here at home, another Stinson plane—the Voyager—has carried out 65 per cent of the operations of the Civil Air Patrol. CAA records show that the Stinson Voyager is the safest personal plane ever produced in quantity.

The Stinson Reliant AT-19 is widely used by the British as a navigational trainer. And almost every airline in the United States uses Stinson planes to train and check their pilots.

THE VOYAGER 125

The first plane designed by Stinson for future mass production is the Voyager 125.

The Voyager 125 is a product of Stinson engineering, designing, and production skill gained in our 19 years of experience in building quality personal planes—first for safe peacetime flying and then for tough battle flying.

The Stinson Voyager 125 is a family plane that carries the pilot and three passengers, with plenty of luggage space beneath the back seat. Powered by a 125-h.p. engine, it has a cruising range of 580 miles, a rate of climb of 670 feet per minute at sea level, and service ceiling of 14,000 feet. It has a maximum speed of 128 m.p.h. and a cruising speed of 116 m.p.h. It takes off, with flaps down, after a run of 550 feet, lands with a roll of 280 feet.

We welcome inquiries about the Stinson Voyager 125 and about our plans. The Voyager 125 will be coming off the assembly line 90 days after the time when the necessity no longer exists for allocation of all manufacturing facilities to production of airplanes for the Armed Services. Write to *Private Sales Director, Stinson Division, Consolidated Vultee Aircraft Corporation, Wayne, Michigan.*

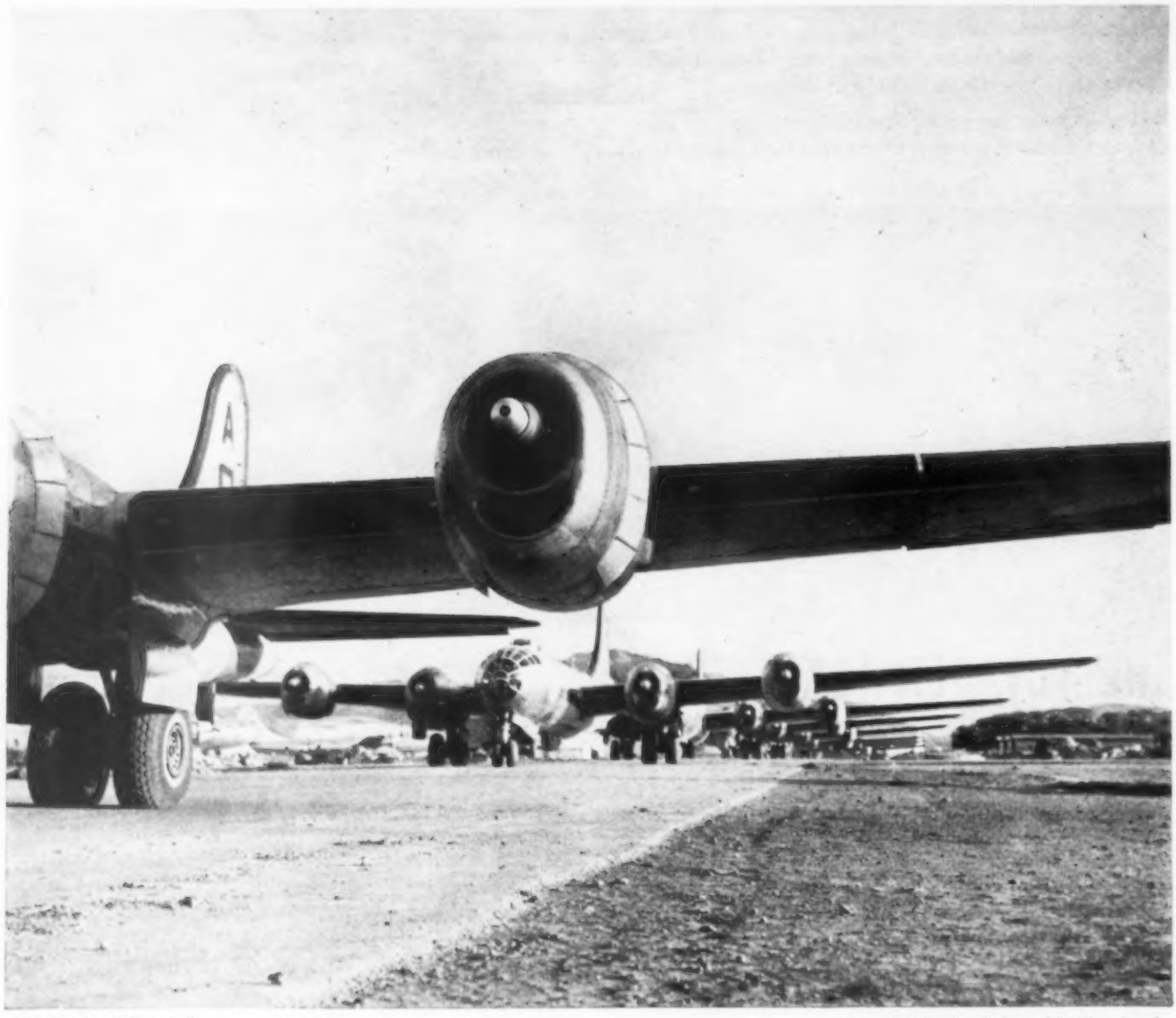
Here's news for owners of Stinson planes

You can obtain parts for your Stinson plane through your local Stinson Distributor, or direct from the factory. Stinson service will help keep your plane in the air!

Stinson

The Aircraft Standard of the World

DIVISION—CONSOLIDATED VULTEE AIRCRAFT CORPORATION
WAYNE, MICHIGAN



Official Photo—U. S. A. A. F.

Finish the Fight—with War Bonds

. . . and more to come

With engines warmed up for the take-off, Boeing B-29 Superfortresses fill the long runway on Saipan . . . one behind another, as far as the eye can see. Across the field, as on other fields in the Marianas, still more wait to wheel into line. Tomorrow you will read in your paper: "Industrial targets in Tokyo have been hit again by a force of over 300 B-29 bombers."

It was less than a year ago that the first attack on Japan by the giant Superforts thrilled the nation. Today their valiant crews are regular commuters on the more than 3000-mile round trip. In waves of sky-filling formations, they carry destruction to the enemy's workshops on a relentless schedule.

Back of this achievement is another story—an epic of production. To design, build, test and manufacture in quantity an airplane that so far exceeded all previous bombers in bomb-load, speed and range — and do it *in time* — was an unprecedented task. It called for pioneer work in engineering, tooling and planning. New facilities and processes had to be started from scratch. Methods had to be devised for putting the vast manufacturing program into effect, not only in Boeing's own plants but in those of other aircraft companies, chosen by the Air Technical Service Command of the Army Air Forces to help increase quantity production of the big planes.

Impossible as the job looked, Boeing men were equal to it. Superfortresses are rolling off the production lines in steadily mounting numbers. In the hands of hard-hitting American airmen, they are vital weapons in the war against Japan, and there are more . . . many more to come.

Tomorrow Boeing research, design, engineering and manufacture will be applied to peacetime aircraft for your use . . . your assurance that any such product "Built by Boeing" will be built to lead.

DESIGNERS OF THE B-29 SUPERFORTRESS • THE FLYING FORTRESS • THE NEW STRATOCRUISER
THE KAYDET TRAINER • THE STRATOLINER • PAN AMERICAN CLIPPERS

BOEING

CESSNA UC-78 IN CIVILIAN DRESS makes good-looking 4-place airplane but twin 225-hp. Jacobs engines burn 30 to 37 gallons of gas hourly at cruising. This one was converted by Leslie H. Bowman, Texas aircraft sales and service operator, who paid $8,500 for it on surplus market and spent $4,000 licensing and converting it into first-class shape. His analysis of the UC-78's good and bad points is given in the accompanying article.

Private Flying Roundup:

Production Prospects; Cessna Conversion

By GEORGE E. HADDAWAY

WE now can look forward to buying and flying bright and shiny postwar models of personal type airplanes in the very near future. This fact became obvious from fast moving developments in Washington during April.

First of all the War Production Board plans to cancel out Limitation Order L-48 which prohibits the production of airplanes for the civilian market. With this order lifted, the manufacturers will then need the green light to tool up for their new models and reasonable assurance that the government will protect them on the manpower situation, permitting them to allocate a modest number of engineering and production personnel to the immediate task of clearing the decks for action.

Every index points to the fact that victory in Europe will permit these concessions. WPB is giving sympathetic consideration to proposals made by the lightplane manufacturers that partial reconversion be granted now. One such proposal was that each manufacturer be permitted to produce 25 units of one postwar model for use as demonstrators throughout the country, with a view towards completing tooling operations during this initial production.

With new models in the hands of dealers, the airplane-hungry public could receive demonstrations and place orders, thereby building a solid foundation for scheduled production of postwar models—a most desirable element in achieving intelligent reconversion. Practically all of the personal plane makers have orders with cash deposits. It is universally agreed that these orders would be expanded a hundred fold if demonstrators were available.

Deliveries in 60 Days

Meanwhile, the manufacturers are not waiting for the government agencies to make up their minds as to when and how the industry is to get going. They are busy establishing their dealer and distributor set-ups, holding dealer meetings and doing everything possible to get airplanes into the field as quickly as possible after the full green light is flashed.

For instance, at a recent Piper Aircraft dealer's meeting in the Southwest, the question was asked how long it would take to get deliveries after the government said yes. The answer came back that within sixty days for substantially improved prewar designs and perhaps early in 1946 for pure postwar models now in the experimental stage.

The Piper company, prewar leader in the lightplane market, does not believe that prices will be much higher because of higher labor costs. Piper expects to absorb the higher labor costs by a reduction in fabricating costs due to highly improved tooling and production methods. Naturally, unit costs of airplanes will remain substantially higher if production is restricted, i. e., the OPA ceiling prices. But when all restrictions are taken off and the

production flow is normal, prices will drop.

In the meantime, if you're airplane hungry, you'll have to be satisfied with used equipment—if you can find anything worth the price for temporary use. Latest surplus development was the dumping by DPC of such white elephants as BT-13's, AT-6's and even B-17's and B-24's into the surplus market.

With surplus aircraft sales engrossing more twin-engine types, the Cessna UC-78 series is receiving considerable speculative attention, both by operators interested in reconditioning and reselling them and by persons needing or seeking something to fly for business or pleasure. But if there was a time when prospective surplus buyers should proceed with caution, this is it.

Basically a good airplane, the surplus Cessna's trouble is that it has too many "angles" to trip the unwary buyer. To be licensed for commercial operations, it requires considerable rework. Moreover, a large number of the series received severe and overtime handling by student pilots. War emergencies forced many improvisations which reduced the performance of many of the Cessnas. For example, fixed-pitch wooden propellers eliminated single-engine performance in hundreds of cases, and about one-third of all of the series were painted with camouflage—the poorest paint from the standpoint of fabric protection and the worst base on which to repaint. None of them have been hangared, thus adding to the detriment.

Experience Cited

One of the country's leading aircraft sales and service operators, Leslie H. Bowman of Fort Worth, Texas, has acquired considerable experience with the UC-78. He bought four and has learned the "angles" involved in their conversion as well as, if not better than, any recognized operator in the business. For the guidance of others, here are some of the things Bowman has to say about surplus UC-78's:

"I doubt if there has ever been any airplane as badly condemned by the young fliers of the Army and Navy as the UC-78. Some have said it couldn't get over the mountains; it shouldn't be stalled lest the wing fall off; it couldn't be flown in rough air; it couldn't be landed in a cross-wind, etc.

"The first thing I did was to go to the Cessna factory and find out as much as I could about the plane from the people who built it. Don Flower showed me how he thought it should be flown and I flew it under his guidance for an hour or two. Then I came back to Fort Worth and bought one of the best surplus UC-78's I could find and flew it about twenty-five hours. I found out you have to know the 'do's and don'ts' about the airplane, and that once you learn those things you find it a good airplane.

"Work was started several months ago toward licensing the Cessna UC-78. It is now licensed to the point that it will carry four persons. Due to the fact that the CAA personnel who did the licensing showed the airplane landed sixty-six and five-eighths miles per hour instead of sixty-five mph., they cut its gross load from 5,700 pounds to 5,400 pounds, which eliminated the fifth occupant. This, incidentally, detracts from the airplane's resale value, especially to the business man who must hire a pilot. I would say it cuts at least 50 per cent from its resale value.

"We did a lot of experimenting in modifying the first UC-78 we bought, sound-proofing the nose, sidewalls and top; reupholstering; making new seats and raising the back of the seats to add

FLIGHT PHOTOS OF PQ-14

Although secrecy still shrouds their war role, red-painted Culver target planes are frequently seen on ferry trips through the Midwest and Southwest. The fast little tricycle, single-seater is designated as the PQ-14, and its engine reportedly is rated at 150 hp. for take-off. Franklins and Lycomings are used.

—(Robert Yarnall Richie Photos.)

comfort, etc. Altogether we spent about $3,500 or $4,000 over the cost of the airplane, and that includes the cost of refinishing it in a high gloss, hand-rubbed finish that is really beautiful. We upholstered the cabin in whipcord and broadcloth, and installed an outside baggage compartment door.

"Incidentally, we took out all the radio equipment and converted the transmitter to crystal control, meeting FCC license requirements, at a cost of less than $200, labor and parts included. We rebuilt a new platform in the nose and mounted the set there, thus gaining more cabin space."

Cessna NC licensing kits are available for $80 at the factory. But relicensing the plane is one thing and making it completely flyable is another. Bowman's experience has been such that he believes anyone buying a UC-78 should be prepared to spend from $3,500 to $4,500 in modification and conditioning—much more if it needs recovering or engine overhaul (recovering alone would cost $4,500 to $5,000, according to Bowman).

Good Performance

Bowman said he had found the UC-78 he selected and reconditioned to be "one of the easiest airplanes to fly, both in the air and on landing and take-off, that I have ever been in." He continued: "There are a few 'don'ts' involved, and this airplane probably has one or two severe 'don'ts' because it is lower-powered than most twin-engine airplanes, having Jacobs L4MB (R755-9) 225-hp. engines, rated at 245-hp. for take-off. But if common sense and good judgment are applied, there is nothing basically dangerous about the airplane. It has a good structure, and is very stable in smooth air in all directions, although it tends to swing the nose quite a bit in rough air. About half of this swinging can be taken out by blocking the rudder—not using it, but just holding the feet solidly on the rudder. The visibility is excellent—better than any single-

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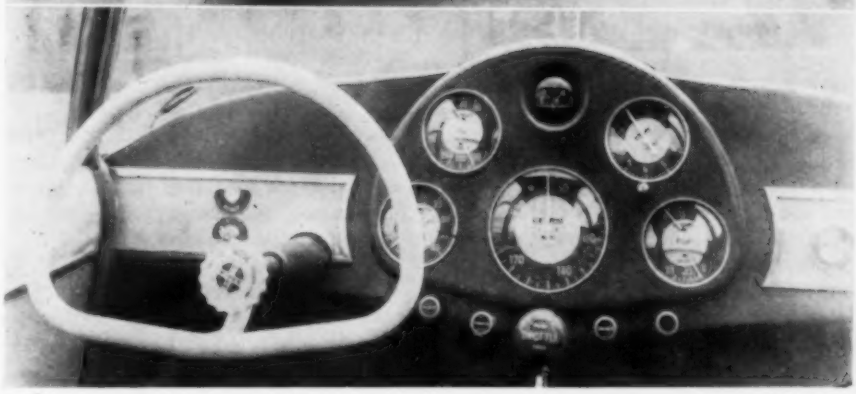
FIRST PHOTOS OF PIPER PUSHER

Here is Piper Aircraft's experimental pusher Model PA, powered with a Franklin 90-hp. engine which is mounted below and behind the passenger compartment. The propeller shaft runs upwards from the engine in an inverted "L," permitting use of a reduction gear for more efficient propeller operation. Mounting of the engine in the belly of the cabin provides exceptionally low center of gravity.



The Charter Operator's Views on Regulations

THE aircraft service operator (fixed-base) does NOT want to be put under economic regulations. He knows why—and says so in stout language.

The Civil Aeronautics Board is currently studying non-scheduled aviation service to determine its needs in the way of regulations. At a hearing held recently in Washington, Col. Roscoe Turner, president of the National Aviation Trades Association, warned that additional regulation at this time is not only unnecessary but would sound the death knell to many small aviation enterprises and penalize a wide range of aviation activities in the non-scheduled field.

"If the CAB begins to regulate non-scheduled operators before we know really what business we do have," said Turner, "then the door will be slammed in the face of hundreds of war veterans who want to open up small aviation enterprises when they return home. Under non-regulated conditions of today, it is hard enough for us to keep from writing all our business experience in the red. If restrictions on our operative freedom were imposed, such as tariffs, or territory limitations, very few of us in independent commercial operation could hope to survive. In other words, the boys who are winning the air war for us would return home to find no opportunity left for them to start up as independent commercial operators; all territories would be closed under CAB permits granted to applicants who are operating today.

"None of us who are in this business —and who are really backing those fighting airmen of ours — want any closed-door monopolies granted to us at this time. Instead, we'd like to see the whole field of non-scheduled operation kept open and free, and let him who can make a go of it, pitch in and do so. Those veterans are going to find it tough enough when they return home, as it is; let's not make it any tougher on them by parceling out rights on non-schedueld flying activities while they're still in there fighting our Axis enemies."

Talk of "economic regulations" of non-scheduled air service chiefly concerns charter flying and air taxi operations, but it would also affect closely-allied activities including agricultural flying, aerial advertising, photographic and topographic aerial work; flight instruction; sale of aircraft, parts and accessories; service overhaul and rebuilding of aircraft and engines; local passenger flights for pleasure or sightseeing; miscellaneous airport sales of food, specialized items and non-aviation products, etc. The big point is that aircraft service operators generally have found it necessary to engage in several or all of such non-scheduled pursuits in order to realize sufficient volume of business to make dependable charter or air taxi service available to the public.

Desiring no exclusive privileges itself, non-scheduled aviation asks continued freedom to develop strength for survival. Economic regulation over charter service would be ruinous.

Some operators may not understand too clearly just exactly what economic regulations involve. But when it is explained that a CAB certificate of convenience and necessity would probably mean, among other things, that the non-scheduled operator would have to file tariffs or a schedule of rates, then the operator really begins to warm up on the subject.

Letters Express Views

"Leave us alone" ran the general tenor of replies to an NATA questionnaire asking its members to comment about CAB regulations for non-scheduled service. The replies expressed stout opposition to economic regulations, at least until non-scheduled operations develop such a volume of business and experience to justify governmental attention.

To the question "Do you believe that now is the time for CAB to proceed with the granting of certificates for non-scheduled activities?" Eighty-one per cent of the answers were "No."

Almost all operators answering the questionnaire said no attempt should be made at economic regulation of non-scheduled service until after the war. A number said "Never." A few specified a period of from two to five years should elapse after the war before this problem should be attacked. Only three operators indicated economic regulation should be started at present. Here's a typical comment on the matter of certificates and economic regulations:

"Perhaps the best way I can explain my viewpoint is to make a very flat statement that the less the government has to do with charter service the better off the operator will be. It seems to me that unless a company is operating a scheduled service, either as an airline or as a feeder, the regulation of charter service is unnecessary. I cannot see how or where it would be even remotely possible to offer charter service at a rate anywhere near comparable to scheduled rates. Therefore the only regulation necessary would be for safety of operation, which exists today through minimum requirements of flight and equipment. As far as exclusive territory is concerned, that eats right into the fundamental principle of charter service, whereby we offer to take anyone to any point he wants to reach. In an exclusive territory we would do a lot of charter work, but it is not the exclusiveness but a low price that is the controlling factor. You cannot offer a low charter rate without mail or some other form of subsidy. Naturally, mail service would not be feasible on an indefinite schedule. This leaves subsidy under some other form and that, definitely, would be the worst thing that could happen to non-scheduled aviation."

Another non-scheduled operator expressed himself like this: "At the present time a minimum standard for operations to provide reasonable safety to the public and a uniform price for services is all the regulation necessary. It might be desirable to issue certificates on the present 'Approved School' basis. Charter operations restricted to a certain territory will cut all operators' potential business. An appropriate time for CAB to proceed with this

(Continued on page 72)

From Kansas City comes this trim little sport plane developed by M. E. Salvay and G. A. Stark, who say it will cruise at 110-mph. and can be produced for the $1,000 market. Called "Skyhopper," it has a 50-hp. Continental fuel injection engine.

Experimental Single-Seater

ANOTHER single-seater for the sportsman pilot has made its appearance in a bid for the postwar market in which Piper and Lockheed one-place designs have been prominently mentioned for several months. The new entry is the "Skyhopper", developed by a couple of enterprising aircraft engineers who have established a new firm, Aviation Booster's, Inc., at Kansas City, Mo.

The "Skyhopper" is a 50-hp. single-seater embodying several construction features to simplify production and maintenance, and is described as being in the $1,000 category. Speeds of 110 mph. cruising and 125 mph. top are "guaranteed," according to the designers. It is still in the experimental stage and has yet to be licensed.

Dimensions include a 25-ft. wingspan, 18-ft. overall length, and 63-in. maximum height. The gross weight is 850 pounds and empty weight 612 pounds, but the designers say its wing loading of 8.5 pounds "puts the ship out of the floater classification." The power plant is a 50-hp. Continental with fuel injection. Fuel capacity is 10 gallons, which is said to provide a safe cruising range of 275 miles.

Small Field Performance

One of the goals of the new design is operation from small airports, farms and pastures, and the developers say less than 400 feet of run is needed for it. Timed tests are cited to place its rate of climb at 750 feet per minute. It has hydraulic brakes, hydraulic shock struts and 6.00 x 6 low pressure wheels. Its landing gear is of the fixed-position type, and a combination steerable and full-swiveling tail wheel is provided.

The "Skyhopper" employs a two spar wood and plywood, fabric covered wing. Fuselage is of welded steel tube construction, faired and fabric covered. Plywood fixed tail surfaces are used with welded steel rudder and elevator, fabric covered. A welded steel truss inside the wing carries all landing loads.

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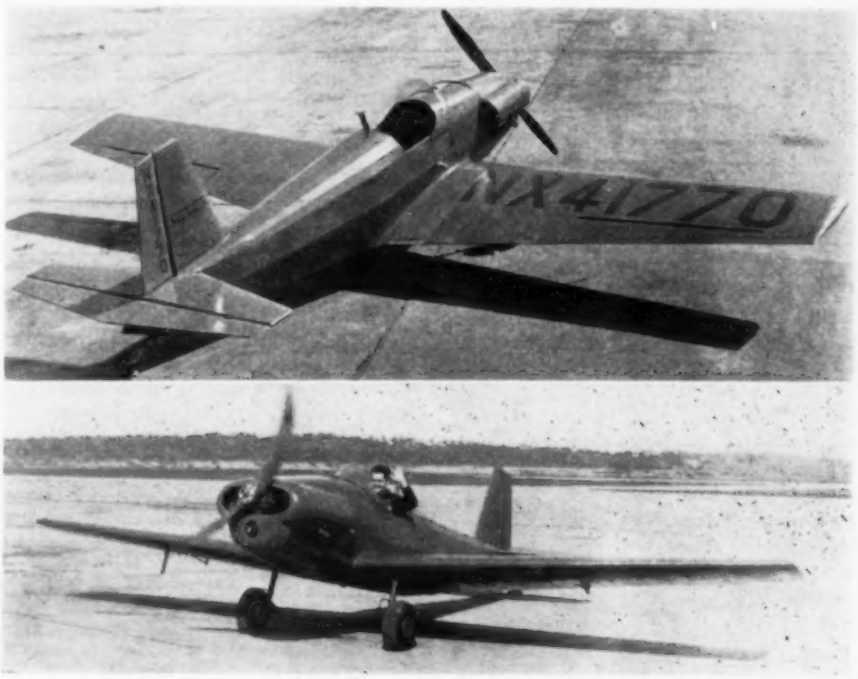


DESIGN FOR PRODUCTION is indicated by these front and rear views of the Skyhopper. Note squared wingtips, simple tail surfaces. Fuselage is of welded steel tubing and fabric-covered plywood. Tear-drop plexiglas canopy is planned.

Design Factors for Local Air Service

A searching analysis reveals promising possibilities for feeder airlines —if new aircraft provide practical economy and flexibility.

By NEIL R. BERBOTH
Development Division,
Fairchild Engine & Airplane Corp.

MUCH has been written on the subject of feeder airlines, ranging from extreme optimism to extreme pessimism. A flurry of activity in aviation circles resulted in the filing of hundreds of applications for feeder routes, Civil Aeronautics Board investigations and hearings, and designs and suggestions for various types and sizes of aircraft. In the midst of this activity many sound principles and ideas have been developed, many other ideas and hopes have been dashed.

The Development Division of Fairchild Engine and Airplane Corporation launched a survey of the local airline transport picture. The purpose was to establish a foundation for logical conclusions as to what the possibilities might be for development of local airlines, and what might be the characteristics of and potential market requirements for the number and type of transport aircraft.

A large potential transportation market of both a long and short-haul nature can only be served through establishment of a comprehensive local air network, and the overwhelming proportion of this potential market falls in the extremely low cost bracket of two cents per passenger mile and less. It seems a safe conclusion that any traffic which might be developed in this market by local airlines would vary in relation to the fares charged.

Economy Essential

Perhaps the significance of this cost element has not been given sufficient weight by many who are directly concerned with the future plans of short haul air transportation. The results of the Civil Aeronautics Board's local-feeder investigation and the exhibits of new and existing applicants presented in hearings before the Board indicate that the passenger fare rate base planned for short haul operations is generally about five cents per passenger mile. If the average passenger travels fifty miles or even seventy-five miles, and a fifty-cent taxi fare at each end is assumed, then the average passenger fare would actually be from 6.3 to 7.0 cents per passenger mile, or three to five times as great as rail or bus fares.

This fact has not escaped the attention of the Board, for in its opinion it found that the prospective fares would not tend to increase traffic potential to a self-sustaining basis, which seems a masterpiece of understatement. The unalterable conclusion, then, is that aircraft manufacturers and airline operators must, in combination, design more economical aircraft and operate them at a cost which will permit passenger fares low enough to develop the potential traffic. A study of rail and bus fares between various local points throughout the United States and over various short distances indicates that the highest passenger fare which might be expected to encourage the development of local passenger traffic would be in the neighborhood of 3.5 cents per passenger mile, including airport-to-city transportation.

What then, is the target in terms of operating cost which must be attained in order to provide passenger fares based on 3.5 cents per passenger mile? Perhaps the most important factor is the relationship of indirect flying and administrative overhead costs to direct flying costs. Such non-flight costs have increased considerably in relation to direct flight costs during the past six years, from approximately 44 per cent of the total operating costs in 1939 to an estimated 60 per cent in 1944. This field of non-flight operating expense presents the greatest opportunity for reduction of costs available to local operators.

Considering the least favorable circumstances in setting up such a target, it would appear reasonable to assume that non-flight costs amounting to 50 per cent of the total cost may be attained on the average. By the same token, it is assumed that a reasonable operating profit might be 15 per cent of the total operating expense.

On the further assumption that 15 cents per mile represents a possible maximum mail revenue, and that 2.5 cents per mile may be the maximum average express revenue, a basis for estimating required direct flying cost is derived. It has already been stated that 3.5 cents a passenger mile represents a target passenger fare. It is further assumed that a small airplane in local operations may achieve a passenger load factor of 50 per cent. Quite naturally, the resulting figure would depend upon the seating capacity of the airplane. Considering two hypothetical sizes as being representative types adaptable to short haul operations, the resulting target direct flying cost for a twelve-passenger airplane would be 17 to 20 cents per airplane mile, and for a twenty-passenger airplane 23 to 26 cents per airplane mile.

To achieve such results will require greater emphasis upon maintenance in the design and construction of the airplane. Perhaps the most important achievement in design would be in increasing the ratio of useful to gross load, in other words, carry the required payload with less airplane and less engine.

It has been contended that existing transport aircraft cannot save appreciable travel time over surface travel for passenger trips of less than seventy-five miles, except in cases where terrain makes surface transport difficult. The basis for this contention is the fact that city-to-airport ground time constitutes an increasingly greater proportion of the total elapsed time, and to a lesser extent the effect of many stops at short distances upon overall system speed. This contention does not apply to those passenger trips which are of a feeder type, since great time savings would in this case almost always be apparent.

The measurement of this type of short haul operating efficiency is highly flexible, and cannot be estimated by simple block-to-block speed comparisons. It would be much more conclusive to observe the results of a

survey of air, rail, and bus running times between a large number of representative cities and towns in various geographical areas. Such a survey would probably show that air trips of fifty to seventy-five miles would almost never take longer than surface trips, and in the majority of cases would effect time savings of from several minutes to one and one-quarter hours, depending upon the excellence of surface transport.

Let us make an example of potential travel time comparisons, including a fare comparison, assuming best possible surface transport conditions. Under present day operating conditions the comparison of air, rail and bus efficiency over a fifty mile air distance would appear as follows:

	Air	*Rail*	*Bus*
City-to-City Elapsed Time (Hrs.) (Including Airport-City Ground Times)	1:15	2:05	2:13
Passenger fare	$1.75	$1.15	$0.95

In approaching the subject of the number of aircraft that may be needed in the early phases of operation of local airlines, it must be pointed out that any quantitative estimates made are estimates only, for there are too many question marks standing in the path of conclusive prediction.

A survey of existing and prospective operators has shown that a division of thought exists as to the airplane size required. Existing airlines contemplating expansion of local operations developed from their present routes favor a larger plane of approximately 16-20 passenger capacity.

Prospective feeder line operators have indicated a desire for a smaller size airplane of eight to fourteen passenger capacity, although in some cases a capacity as high as eighteen passengers has been mentioned. This requirement is based upon an estimated lower traffic potential between smaller communities, when considered with the desirability of high trip frequencies. Under the circumstances, a reasonable conclusion is that the ideal airplane should be as small as is consistent with the demands of the traffic.

The difficult problem is the evaluation of the demands of the traffic. On the assumption that traffic potential will be limited, at least in the initial phases, to an approximate maximum of from six to ten passengers per mile, it can be estimated that one type of airplane which would meet the requirements of local operation would provide a convertible capacity of from eight passengers, baggage and 1,000 lbs. of cargo, to twelve passengers, baggage and 200 lbs. of cargo. Such a plane should have provisions for operation in mail and express pickup service when it is necessary and profitable.

TABLE OF SELECTED APPLICATIONS

Number Applicants Selected for Classification	48
Number Applicants Classified A, in Whole or in Part	13
Percent of Applicants Classified A	27.%
Total Route Mileage Requested by 48 Selected Applicants	176,418
Route Mileage Classified A	37,018
Percent of Route Mileage Classified A	21.%
Percent of Route Mileage Classified B	38.%
Percent of Route Mileage Classified C	41.%
Total Routes Requested, All Selected Applicants	493
Average Route Miles Per Route	358 miles

Ave. Route Miles Per Route	Number Ave. Routes	Percent Of Total Routes	Variable Mileage From	To	Percent of Stops Made At Variable Mileage*
100 200	4	8.3%	1	25	21.4%
200 300	12	25.0	25	50	36.0
300 400	15	31.3	50	75	22.5
400 500	9	18.7	75	100	11.00
Over 500	8	16.7		Over 100	9.1
TOTAL	48	100.0%		TOTAL	100.0%

Average Miles Between Stops, All Selected Applicants	54 miles
Average Miles Between Mail/Express Pickups, 7 Applicants	19 miles
Average Stops Per Route	5.5
Average Mail/Express Pickups Per Route	17.8
Approximate Average Pickups Per Stop	3

*Based on an analysis of thirty (63%) of forty-eight selected applicants.

Aircraft Requirements

The Fairchild survey was aimed at estimating the possible market requirements for such an airplane, on the assumption that several local airlines would be established in strategic geographic areas allowing for possible future development into a comprehensive local air network, if experimental operations proved economically sound. It was also assumed that non-scheduled air services would develop only as an auxiliary of local scheduled operations, performing specialized services at higher fare rates, and perhaps as part of the same organization.

A thorough analysis was made of all feeder line applications before the Civil Aeronautics Board as of September 30, 1944, of which there were several hundred. Of the total, there were approximately 161 proposals envisioning a true short haul scheduled service, and it was decided to confine the survey to a study of approximately one-half of those representative applications proposing service with conventional aircraft, at the same time attempting to select those representing the most reasonable chance for success.

Forty-eight applications were thus selected, and were further classified three ways in accordance with an evaluation of their possibilities for being granted. It is important that the basis for this classification be explained, together with its limitations. It must be recognized that it was manifestly impossible to forecast with accuracy exactly which applications would be granted, in whole or in part, by the Civil Aeronautics Board, nor was it important to the survey results to make such a forecast. What was important was that a proper evaluation be made of the potential maximum route mileage which might be granted, and in what geographic areas. It was felt that the proper approach to the problem was through a thoughtful analysis and classification of specific route applications, because the Board's decisions as to service and route mileage in various areas would be based upon the evidence obtained in public hearing regarding such applications.

The factors affecting the classification included: (1) evaluation of proposed routes and services from an economic standpoint; (2) effect of the proposed services upon the revenues and services of present air transportation systems, especially the smaller systems; (3) financial background and affiliations of the applicant, where known; (4) conservative reputation of the Board, and its approach to the problem as an experiment; (5) recent trend of Board decisions, which have tended to continually strengthen the position of the smaller existing airlines, and (6) consideration of the expansion plans of the smaller existing airlines, especially as regards local service. The results of the classification are shown in the accompanying table.

A careful analysis of the approximate aircraft requirements and yearly utilization was made for thirty-two (67 per cent) of the forty-eight selected applications. The yearly utiliza-

(Continued on page 72)

New Plastic Laminate for Aircraft Parts

Resin-impregnated fabric, including Fiberglas, is replacing metal in numerous components of Consolidated Vultee planes. Although expensive, it is readily processed and offers many advantages.

By THOMAS A. DICKINSON

LATEST addition to the realm of aircraft materials is Conolon, a low-pressure plastic laminate which is now being used to fabricate airplane parts that are stronger and lighter than normally-used aluminum-alloy parts. It was developed by Dr. G. G. Havens and G. A. Gordon, research engineers for Consolidated Vultee Aircraft Corporation.

Three types of Conolon currently exist, and each comprises fiber impregnated with a thermosetting resin. Type "F" employs extremely fine filaments of Fiberglas; type "C" is reinforced with high-strength cellulose fibers, and type "FC" is a combination of the first two types. The laminating resin used in connection with all three types is produced by combining thermoplastic and thermosetting resins, and has been designated N13p.

The impregnation of the fibers is accomplished simply by passing the fabric through a bath of the N13p resin, which is usable at room temperatures, and between two rubber squeegees, which remove excess resin. Then the material is air-dried for a period of 24 hours, or oven-dried for a period of 20 minutes at a temperature of 140° F. When it is oven-dried, the fabric should be suspended so that it will not wrinkle, sag, or be subjected to dust or moisture.

The procedure followed in laminating Conolon moldings varies in accordance with the nature of the parts to be fabricated and the stresses to which they will be subjected. Generally speaking, the lamination should be such that all of the fabric fibers will run parallel to the direction of maximum stress; however, it has occasionally been found advantageous to position the layers of fabric so that the fibers will be at an angle with one another. The curing may be accomplished either in a vacuum bag or in a hydraulic press at a pressure of 10 to 15 psi. and a temperature of 300° F. (+25° or —10°) in a period of approximately 30 minutes, depending on the thickness of the laminate.

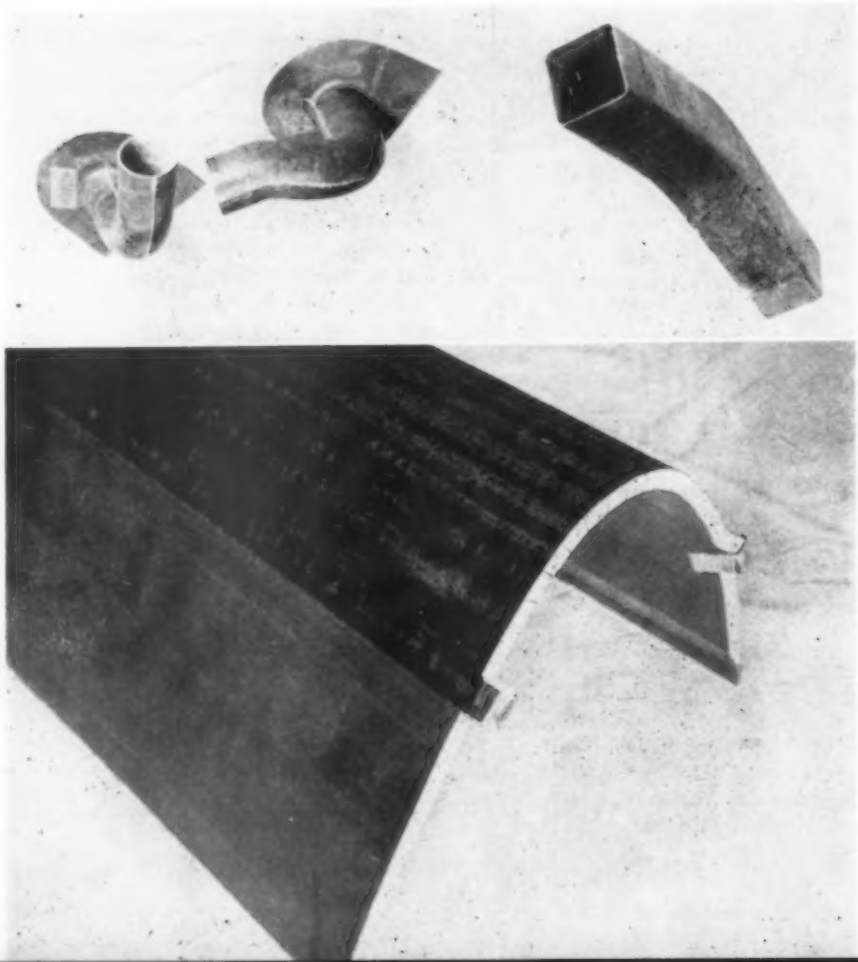
Precautions that must be observed in order to obtain good Conolon laminations are as follows:

(1) The fabric must contain the correct amount of resin to produce a finished laminate containing 33% (±7%) solid resin for Conolon "C" and 27% (±7%) for Conolon "F."

(2) The resin-impregnated fabric must be stored in a sealed container at a room temperature of approximately 75° F. when it is not to be used immediately. In no case should the impregnated fabric be stored longer than one month or at temperatures of more than 75° F.

(3) Extreme care must be exercised in building up laminates to see that the fibers are laid in the proper direction, because the unidirectional Conolon fabrics have 100 per cent of their strength concentrated in one direction so that any error in laying up the cloth will result in a seriously weakened product.

(4) Excessive temperatures must be avoided in curing the "C" and "FC" types of Conolon.



VERSATILITY OF NEW MATERIAL is shown by these aircraft components made of Conolon. Although its component materials are expensive, Conolon is economical for complex parts such as the tube sections at top, for which metal fabrication methods would be more costly in time, tooling and labor. Lower photo shows part of a wing's leading edge made of Conolon, which excels aluminum in resisting scratching and marring. —(Convair Photos.)

PHYSICAL PROPERTIES OF CONOLON

Maximum modulus of elasticity	4.7×10^6
Maximum tensile strength	120,000 psi.
Maximum compressive strength	56,000 psi.
Specific gravity	1.64
Curing pressure	10-15 psi.
Curing temperature	275°-500° F.
Curing time	10 min. @ 400° F.
Resistance to ordinary acids, alkalies, and solvents	Good
Resistance to water, oils, and cutting compounds	Good
Maximum Rockwell hardness (M-scale)	110
Maximum impact resistance edgewise	126 ft.-lbs./in.^{2}
Ultimate bearing strength	82,000 psi.
Resistance to vibrations	Excellent
Normal color	Orange
Finish	Smooth, glossy

(5) The molds must be designed so that they will have sufficient strength to withstand the pressures involved in curing Conolon. Although they are comparatively low, such pressures may constitute a very large total force which will cause distortion on sizeable molds.

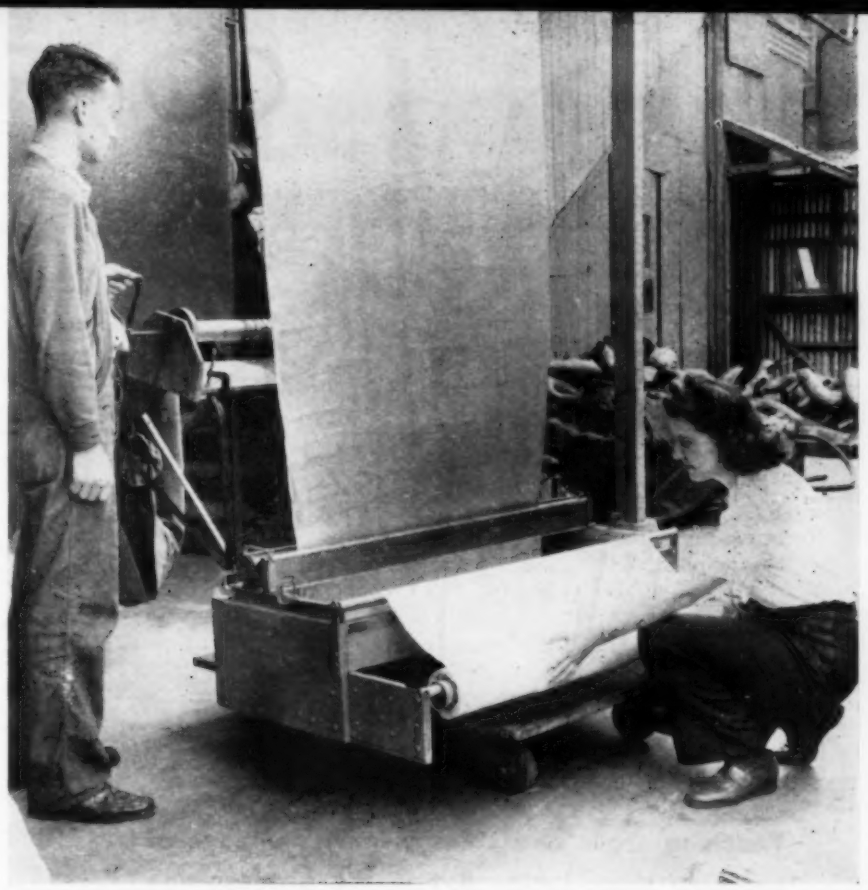
A series of tests were recently made to determine whether Conolon laminations could be cured by means of high frequency heating. The tests were not exhaustive, but the results were entirely satisfactory. Therefore, it now seems possible that Conolon airplane parts will eventually be mass-produced with radio frequency equipment.

Although Conolon has a specific gravity of only 1.64, it can develop maximum tensile and compressive strengths of 120,000 and 56,000 psi., respectively, and a maximum modulus of elasticity of 4.7×10^6.

Plastic Airframe is Possibility

The cost of Conolon at present is rather high, ranging from $1.58 to $3.93 per square yard, depending on its thickness; and, for this reason, the new material is being used only for the fabrication of the more intricate airplane parts, such as ducts and contoured wing surfaces, whose construction with metals would require excessive investments in time, tools, and labor. When the cost of Conolon components has been reduced, it is possible that the laminate will be used to fabricate entire airframes.

Conolon is particularly desirable for the construction of airplane parts, because it has a tremendous resistance to vibrations. In a recent test, the trailing edge overflap of a Liberator B-24 wing was molded from Conolon placed on a vibrating table. Although the laminated part was lighter than a similar aluminum part, the overflap showed no signs of failure after 55 hours of testing. A dural overflap would have been completely useless after a test of this type.



IN MAKING CONOLON LAMINATIONS, Fiberglas or Fortisan fibers must be impregnated by passing the fabric through a thermosetting resin bath, as indicated above. Thereafter, the material is air-dried for a period of 24 hours, or oven-dried for a period of 20 minutes at a temperature of 140 degrees F.

Most plastic laminates have an undesirable tendency to absorb moisture and deteriorate when subjected to salt water and various other liquids. Conolon specimens have been immersed in salt water, benzene, aromatic fuels, and acetone for periods ranging from 24 to 48 hours without signs of deterioration.

Metal and fabric airplane wings lose a certain amount of efficiency after prolonged periods of operation, due to scratches and mars made by small stones and other debris which are encountered while taking off or landing. Conolon wing surfaces are not subject to this loss, because they can withstand an impact of 126 ft.-lbs./in.^{2}

In most chemical and physical properties, type "F" is slightly superior to the other types of Conolon. However, the "C" type is frequently used because of its extreme stiffness. The "FC" type represents a compromise, and it has some of the good properties of both the "F" and "C" types.

★ ★ ★

THIS VULTEE VALIANT BASIC TRAINER is the first plane to have such structural parts as rear fuselage, tail cone and side panels made of glass fiber plastic.

CONFESSIONS of a Flight Instructor

By A. H. KNOUFF
Lt., A-V (T), USNR*

—Illustrated by Lt. Joe James, USNR.

Teaching stalls and spins is only a means of avoiding them later. But in the process you can learn a lot about the airplane and what makes it fly. Here are some examples.

PART VII

WHEN you teach stalls and spins, remember that you really do not want to teach stalls and spins. The important thing is to teach your students how to keep out of them, how to recover if they get in by accident. A flight of several minutes just above stalling speed is of more value than actually stalling the plane. Executing a two-turn spin and recovering on the same heading is a nice trick and gives you a lot of satisfaction, but it is more important to recognize the approach of the spin and avoid it or get out of it as quickly as possible.

In spite of the emphasis that has been placed on spins in the past, they have continued to be the principal cause of fatalities. The trouble is that any method of introducing them in instruction usually lacks the element of surprise. When you try to stimulate an accidental spin, you usually have to abuse the controls to such an extent that the student may get the idea that he will never get into a spin without knowing it. Yet I have accidentally spun in airplanes that seemed impossible to spin intentionally under the same conditions.

While "playing student" in a course for instructors, I have spun lightplanes at less than fifty feet by trying to get back into the airport when they pulled a forced landing on the take-off, or by increasing speed and crossing controls in a tight spiral. Yet many students and experienced pilots have been killed doing the same thing unintentionally. The most enlightening fact is that my "instructors" did not realize that the airplane had started to spin until I pointed it out to them and repeated the maneuver.

Most of my students would not believe Tex Rankin's old saying, "An airplane can be spun from any attitude at any airspeed." To convince them, I dived the plane to about four times its normal stalling speed, and while they watched the indicator, I came back smoothly but rapidly on the stick and fed full rudder.

Angle of Attack

We used to think that as long as you had plenty of airspeed, we were safe from a stall. Most pilots now know better. Speed is relative. Stalling speed depends on angle of attack and *effective* load. I am not an engineer and the "average pilot" won't be interested in the mathematical formulas involved. However, anyone knows that the greater the load in an airplane, the greater the stalling speed will be. The load may be the actual weight that is being carried, or it may be this weight multiplied by the effect of centrifugal force in a turn, loop, or any other change of attitude. The more rapid this turn—or change of attitude—is the greater the load, in effect, will be.

"The cases are endless of pilots ending their careers in the simple act of circling a friend's house."

"Angle of attack" may be a little harder to explain to your students, but you should make sure that they do understand it. I call it "the angle at which the air is striking the wing." When you increase back pressure on the stick, the tail will drop and the wings tilt at a greater angle to the air. Up to a certain point, increasing the angle of attack will increase the lift. Therefore as you increase the load, you must increase the angle of attack to maintain altitude.

Centrifugal force affects air too. To produce lift, air must flow smoothly over the surface of the wing. As the angle of attack increases the air has to turn a sharper corner in order

*Opinions and assertions herein are the author's, and are not to be construed as official or reflecting the views of the Navy Department or the naval services.

to flow smoothly along the wing. Finally the corner becomes so sharp that the air can't make it and skids off somewhere. Of course other air flows in to take its place, but this new air comes from the wrong direction and will not flow smoothly along the wing either. In a word, the air "burbles" and lift is destroyed. The airplane stalls.

I know the last couple of paragraphs sound like a child's first reader, "This is Bob" . . . "Bob has a bat" . . . "Bob will hit the ball with the bat." I try to make all my explanations sound as nearly like a first grade school book as possible. Simple language is the most effective with all beginners.

I think most instructors now explain stalls and spins from the standpoint of angle of attack rather than speed. This makes it easier to explain why you should not use ailerons alone—if at all—to keep the wings level at or near a stalled condition. When you give "right aileron" the angle of attack of the left aileron is increased. If it were already at or near the stalling angle, you will just stall it worse, and instead of coming up the left wing will drop and the airplane may spin.

In a turn, the inside wing tip must support just as much of the load as the outside wing tip, but since it is not moving as fast it is nearer the stall. Often a gust will change the angle of attack so that the inside wing will drop. If you try to hold the wing up with aileron, you may stall it. The drag of the aileron may create a tendency to yaw toward the low wing, slowing it up more, causing it to stall—or at least lose more lift. At the same time, this yaw may give the pilot the feeling that his nose is dropping, causing him to pull back on the stick with tragic results.

Lesson in Stalls

The best procedure, when a wing drops, is to immediately reduce the angle of attack by relaxing on the elevator control — or pushing it forward. Increase the speed of the dropping wing by applying top rudder. This will increase its lift, and it should not be necessary to use any aileron.

How many times have you read that an airplane was making a normal approach, just turning into the field, when the nose dropped and it dived into the ground—one of those "mysterious" accidents so popular with the average newspaper reporter. It happened recently to a military aircraft. The pilot, fresh out of training school, came across the field downwind at low altitude and started a tight turn to land. For some unknown reason he raised his wheels as he started to turn. Observers said the plane was skidding badly. Suddenly it spun in.

"Spins continue to be the principal cause of fatalities."

There was a pilot in our neighborhood who claimed to have about 500 hours experience, much of it as a crop duster. We took turns riding with him and decided we did not want him to solo our airplanes. He talked one of the private owners into letting him use his Taylorcraft, and took it out without asking anyone to check him out. About an hour later, he came in white as the proverbial sheet, proclaiming what a trick airplane it was.

He had been gliding in with *plenty of airspeed* when the ship went into a spin "for no reason at all." By the grace of God, he come out of it barely above ground.

He asked me to ride with him and see what was wrong with the *airplane*. I suggested that he make an approach for a landing just as he had before. He began a glide at about seventy miles per hour. He used his rudder to establish a rate of turn that would line him up with the runway, but when the natural stability of the ship tried to establish a bank corresponding with the radius of turn and excessive speed, he tried to keep it from banking so steeply. The resulting skid enlarged the radius of the turn; so he pushed harder on the rudder to shorten the radius. When he was using almost full cross-control, the plane spun. Since I was expecting this, I had no difficulty in bringing it out.

We went around again, and this time I called his attention to his crossing of the controls before the spin developed. He was a very surprised and humbled "crop duster." I then showed him that with less speed the airplane could be glided in on the flight path he had tried to follow, without using any rudder. He asked me to give him some more dual—and it wasn't long until he was doing a good job of flying. Some know-it-all pilots learn this lesson too late.

I have an idea that the same thing happened in the case of the military pilot. Raising his wheels would allow his airspeed to increase, making it necessary to bank more steeply to maintain a given radius of turn. The stalling speed of the airplane would be correspondingly increased as I have pointed out, and if he tried to prevent the airplane from banking so steeply by applying top aileron, the accident is no longer "mysterious."

Many instructors and books tell beginners to drop their nose to "increase airspeed when they start a turn." I feel that it is unnecessary to tell a student to drop the nose, because it will drop anyway if he maintains the same stick pressure—due to loss of lift with the wings tilted. I stress the fact that he should maintain the *same* airspeed in the turn as in the straight glide. It is true the nose must be lower to do this, but the pilot will be more conscious of the back pressure required to keep the speed from increasing too much.

Then there is the familiar "graveyard glide." This usually occurs in

(Continued on page 70)

"We took turns riding with him and decided we did not want him to solo our airplanes."

Suggested Standards for Safer Airplanes

Personal flying needs a safe airplane which can be flown after a minimum of training. Stall and spin characteristics should receive most design emphasis.

By RAYMOND B. MALOY
Technical Assistant to the Director,
Safety Regulation,
Civil Aeronautics Administration

THE intense interest in post-war civil aviation has resulted in many suggested specifications for the future private airplane. Some manufacturers and publishers have conducted extensive research on this subject and have sent questionnaires to prospective purchasers and readers in an attempt to sense the public's desires in this all-important phase of aviation development.

This, I am sure we all will agree, is a very healthy state of affairs, for we must admit that in the past the aircraft industry has been all too prone to try to sell the type of airplane it happened to build rather than to build the type of aircraft which the general public really wants and will find most useful.

You, no doubt, have many times corrected a layman for using the expression, "driving an airplane," but perhaps the layman is not so far wrong after all, and the use of this term is our clue to the fact that in the future we are going to have to design airplanes that can be "driven" in the air. In other words, the number of controls, their type and use, and direction and sense of motion must follow a pattern with which the general public is not too unfamiliar in order that the transition to a new medium of transportation may be as easy as possible.

It generally is agreed that the public has certain definite desires regarding the functional characteristics of the airplane and that it is qualified to speak on this subject, but it is very probable that these functional desires are all based on the assumption that the airplane is inherently safe and meets some minimum safety standard. It therefore is proposed to formulate a specification in this discussion which will define this minimum safety standard.

A recent survey of the accident record for 1939 and the first six months of 1940 showed that out of 257 fatal accidents, 63 per cent involved stalls, and further, that in 53 per cent of these 257 accidents, the maneuver immediately preceding the accident was a turn, the direct result of which was a stall in 81 per cent of these cases. In other words, 43 per cent of these 257 fatal accidents resulted from stalls out of a turn.

Stall and Spin Characteristics

With these data before us, it is obvious where the emphasis must be placed in formulating a specification for a private airplane which must, first of all, be a much safer and more easily operated airplane than we now have. It is believed that the greatest single item requiring design attention is the stall and spin characteristics of an airplane with the emphasis on the former, particularly in the turn. This is not a new thought as it has been generally held for a number of years; these figures serve only to further confirm this fact.

The Civil Aeronautics Administration and the Civil Aeronautics Board have been working in co-operation with the industry in the development of an airplane category system for purposes of design and operation. At present five categories of aircraft to be known as "normal", "transport-passenger", "transport-cargo", "training or utility", and "acrobatic" appear probable. However, an airplane could be certified in more than one category providing all the requirements of such categories were met. The aircraft proposed in this discussion would fall in the "normal" category which will be placarded against all acrobatic maneuvers.

The first item in any specification must be a rigid definition of the stall and spin characteristics to be required, since this is the one item which requires the greatest attention. It is realized that a true non-stall airplane has not yet been achieved; that is, an aircraft which cannot be stalled under any condition. The closest approach to the ideal has been accomplished by limiting the elevator control to the point that power-off stalls cannot be obtained as long as the rate of change of angle of attack is kept to a nominal value in combination with a root stalling wing. Limitation of the elevator sufficient to take care of the power-on condition, however, usually leaves insufficient control for other conditions of flight.

It is believed, however, that the attack on the spin-stall accidents and the landing accidents should be twofold. The first and most obvious is to set up a rigid specification for the stall characteristics themselves. It is proposed that the requirements in this regard be as follows:

> There should be inherent in the aircraft positive and adequate warning of the approaching stall in both straight and turning flight.
>
> There should be no tendency to spin from a full stall.
>
> There should be no rolling prior to or simultaneous with pitching, or failing that, the motion should be controllable back to level flight, power on or power off with normal use of the controls.
>
> To eliminate the turn-stall accidents, it should be possible to execute a sustained 60°-banked turn with or without power using full up elevator, with simultaneous application of full rudder in either direction without spinning and with no reversal of control force.

In the event that the airplane can be made to spin, the spin itself should be such as to permit recovery with normal use of the controls in 1½ turns without exceeding the limit maneuvering load factor or the placard dive speed, and it should not be possible to obtain an uncontrollable spin by any possible use of the controls, nor should any reversal of control forces be present.

It is not suggested that the airplane actually be non-spinnable since, if the above-mentioned stall characteristics are met, there is very little likelihood of an unintentional spin developing from any possible use or misuse of the controls. However, any manufacturer who desires to build a non-spinning aircraft should be entitled to have his product so listed. In any event, this aircraft will be placarded against all intentional acrobatics, including spins. So far only two aircraft have been designated as non-spinning by the Civil Aeronautics Administration.

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MODERN AIRPORTS

May, 1945

Volume II Number 3

New Okmulgee, Okla., Airport

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Profitable Airports for Aviation Progress

Using facts as revealed in a CAA survey, the Assistant Secretary of Commerce cites the need of prosperous airport management through aggressive, business-like operations.

By WILLIAM A. M. BURDEN
Assistant Secretary of Commerce

DURING hearings on bills to give effect to the National Airport Plan, members of the Senate Commerce Committee revealed a keen interest in the question, "Can airports built with Federal aid be self-sustaining and even return to the government some of its original investment?"

To this the Civil Aeronautics Administration answers, "With efficient management, airports can be profitable both to the municipalities owning them and the fixed-base operators conducting business on them. The Federal government cannot expect to amortize its investment in the immediate future, but the long-run benefits to the nation will be far greater than the cost, just as they have with railroads and highways."

Survey Proves Profit Possibilities

A study by the CAA of profit and loss of 1,048 airport owners and 1,759 fixed-base operators proves this point, we believe. It shows that on the whole there is enough profit in airport operations to enable both the commercial enterprises and the local government owners to make out well if there is an equitable division of revenues.

In actual practice, the municipalities appear to be poor business managers, with only 34 per cent reporting a "profit" in 1940, compared with 59 per cent of the fixed-base operators. Of the owners showing a profit, the largest number netted only between $100 and $499, while the median profit of the operators was in the $1,000-$4,999 bracket.

Certainly, the opportunity exists for profitable airport operation even in the small towns. In fact, the possibilities in the small towns are far better than the uninformed might suppose, for reports from many of our field personnel indicate that as the size of the town decreases, the number of aircraft in relation to population increases.

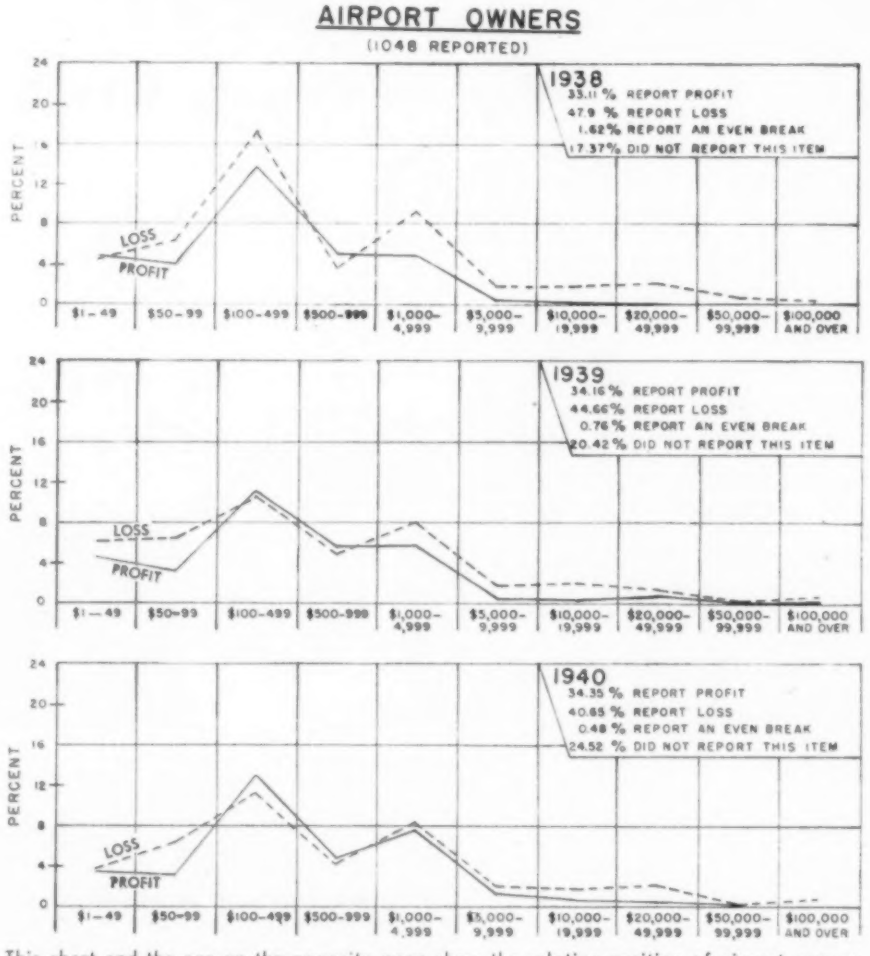
Take a community like Buffalo, Oklahoma, for example. Here is a locality with a population of only 1,200, yet it has ten airplanes, or forty-three times the national ratio of one airplane to every 5,200 population. Two factors in the thriving activity here seem to be the location of the airport—four-tenths of a mile from the center of town, and the aggressive business approach of the operator.

A small city like Kilgore, Texas, also demonstrates the possibilities of developing busy airports. With a population of 6,708, Kilgore has twenty-three locally owned airplanes, or one for every 292 people—better than the national average that would prevail if the goal of 400,000 civil aircraft is reached ten years after the war.

Formula for Small Fields

A very interesting example is that of Buford Airport, Montvale, Virginia. A landing area was established at this town of 300 in 1940, when the Roanoke Airport was closed for improvements. J. L. Buford converted a portion of his 475 acre farm as a temporary accommodation for the fifty aircraft based at Roanoke. He spent $2,500 on the necessary improvements, with $830 contributed by the State.

The nine months during which



This chart and the one on the opposite page show the relative position of airport owners and operators in profits and losses during the years 1938-40. Municipalities (owners) show more numerous and higher losses than operators.

—(CAA Charts.)

Roanoke was closed proved so profitable that Mr. Buford decided to make his field a permanent operation, and improve it to CAA Class 1 specifications.

He now owns four planes and employs two instructors and four licensed mechanics. There are ten privately owned planes based at the field, including those of a minister, the Superintendent of Schools, and a local lumberman. At the present time forty-one students are taking instruction, and since establishment, 310 students have been soloed.

With an average of twenty-five visiting planes a day, in addition to local business, the field is operating practically to capacity. Mr. Buford's restaurant is a major attraction to visiting planes. He also operates a filling station which has benefited from the airport. The aviation fueling installation was made by an oil company at no charge.

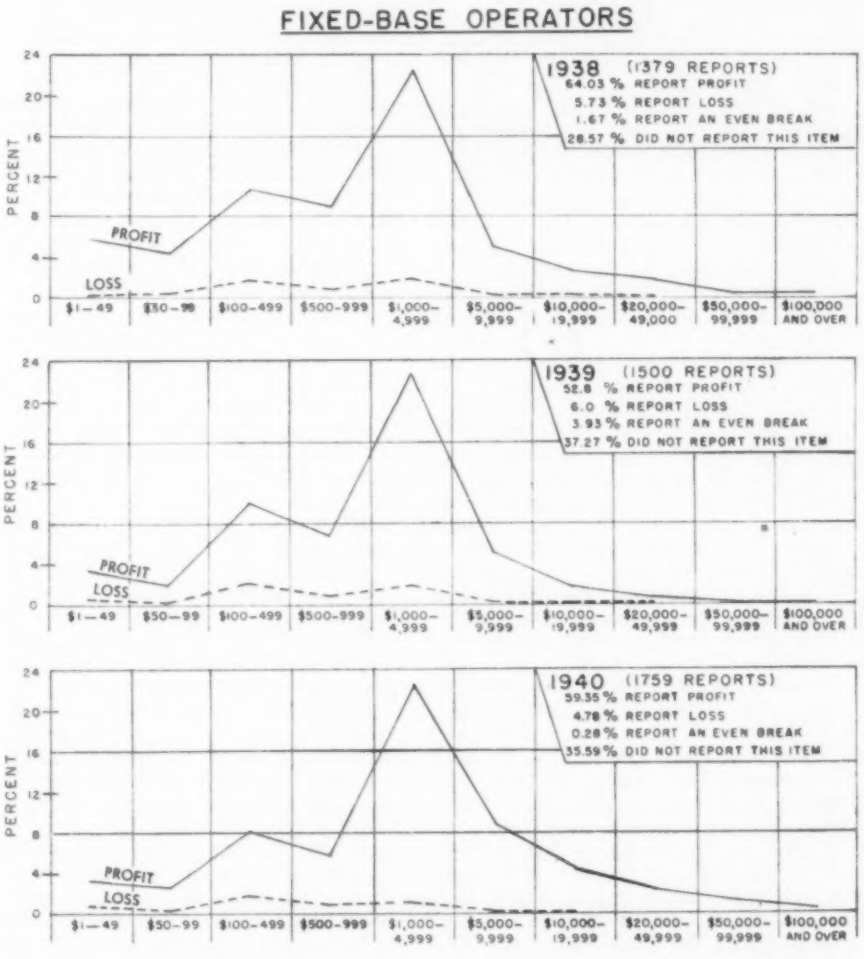
Illustrating the fact that no matter where located an airport serves the entire nation, the field has proven a safe haven for military planes making emergency landings on the average of two a month.

If the individual airport is to be a continuing success, it must be able to prosper financially without discouraging the potential supporters of aviation, the flying public. Too often, in the past, the airport price scales have varied radically, and the flying public has paid on the "all-the-traffic-will-bear" basis.

Efficient Management Essential

As in the grocery store, the cafeteria, the large manufacturing concern, tried and proven business practice will ensure the financial success of an airport. The backbone, and check-sale of soundness is a strict accounting system, and a proper budget. This will be true of all types of airports, large or small, whether they are used for air carrier, private operation, or a combination of both.

The slow-dying glamour of aviation has deterred ordinary business methods of handling airports in the past. Municipal officials have been only lightly concerned with airport deficits, because of a false, overpublicized, circus-like handling of the infant industry. They have neglected to develop non-aeronautical sources of revenue — restaurants, parking areas, and dozens of other types of activities which can be important income producers in airports both small and large.



While only 39 per cent of the municipal owners reported "profits" in 1940, 59 per cent of the operators showed airport profits. The median profit of the operators was in the $1,000-$4,999 bracket, but the largest number of owners showing a profit netted only $100 to $499.

—(CAA Chart.)

However, aviation has grown up rapidly during the war years. The school systems of the country have accepted it as a course necessary to proper preparation for economic and social understanding, and many of our returning veterans who possess both business acumen and technical knowledge will be attracted to aviation and to airport operation in particular.

Co-operation among all the elements in a community is necessary to the full advancement of every local airport. Chambers of Commerce and civic clubs are ideal instruments for maintaining public interest. Obviously, members of the press and radio stations should be members of airport committees.

A co-ordination of thinking and planning between the airport officials, commercial operators at the airports, officials of the CAA, and other interested persons will prevent the mistakes that can be so easily made by those with much enthusiasm and little knowledge.

An airport, providing services and facilities for normal flight operation, repair of aircraft, transportation of passengers, mail, and express, is a complex problem, representing considerable investment, and requiring a man of energy and elastic talent to run it successfully.

His duties are many, his problems great. He must plan the complete airport operation; direct expansions and improvements, and correct previous errors without interrupting service; provide pleasant and mutually beneficial working arrangements for a staff of diversified employes, and tenants; and operate the airport so that it will show a profit without gouging the public.

A successful manager must understand the full potentiality of an airport in public services and the safety requirements both of good judgment and those demanded by the CAR. He must be responsible for the installation and maintenance of the field area, the runways, lighting, hangars, work shops, administrative building, restaurants, control equipment, emergency devices, and various concessions, but he must in addition be a keen and resourceful business man.

Prosperity Through Concessions

Much revenue can be added to the airport income by a judicious encouragement of concessions. The non-aviation revenue at an airport depends on its accessibility, cleanliness, courtesy of service, and other basic truths of selling of any sort.

Most of the concession activities should be centered in, or near the main terminal building, and because an attractive airport draws many people who are not necessarily passengers or pilots, the activities can be of much wider scope than those required by the purely aeronautical public.

Of main interest to the manager should be clean and satisfactory eat-

(Continued on page 54)

Small Towns Offer Airport Opportunities

Airports planned by many communities will need operators. Those who mean business will receive support from aircraft distributors and suppliers.

By J. N. THOMPSON
Vice President, Missouri Aviation Corp.

IF you were to be asked point blank where aviation is heading in the postwar era, would you really know the answer? No one doubts that postwar America will be plane-conscious. Wartime progress in the art of flying is awakening peacetime development of private aircraft. Add to this advancement the desire of thousands who want to fly, and you realize that the forward thinking will start planning the part they will play with the gasoline buggy that has sprouted wings.

Day after day we are asked the same question: What does the future hold for men in aviation? These questions come from pilots and mechanics —young and old. In the past we generally stammered through shopworn suggestions which admittedly sounded simple and ridiculous, but which stopped our questioners temporarily. They failed, however, to satisfy the thirst for factual answers. These men wanted assurance of a postwar livelihood. We only added to the propwash resulting from a rapidly expanding industry.

Small Towns Are Ambitious

Quite by chance we stumbled on at least one answer to the question. In the course of our many contacts we heard from an aggressive chamber of commerce in a small western town with high hopes of going somewhere with a reasonably modern community airport. Not an airport of the million-dollar variety—just a good, substantial plot of ground with hangar facilities to house the many operations attendant to a successful field. They want to make their airport hum with activities from student training to a feeder service for a main airline. When completed, the airport must measure up to the expectations of its airminded citizens. The Chamber of Commerce, however, ran into its first serious problem when it found that an airport does not manage itself. They are in need of an airport manager and operator and are cornered by the lack of access to men familiar with fixed-base operations. This is only one of many communities subjected to a stalemate. Here, then, we have been given an answer to a portion of that puzzling question. If you are interested in being in aviation during the postwar era, do a little selling of yourself to these eager communities. If you have the ability and the background for the job you will be given the opportunity to prove it.

If you are ambitious to be a fixed-base operator, let's see what can be done about injecting some good, sound business judgment into this enterprise of flying, servicing and running an airport. With the right type of management an airport holds promise of substantial profits from the many services which provide a definite source of income. Edgar Guest once said that the reason people pass one door to patronize another store was not so much because of the cheaper price but because of the treatment the folks received. With efficient management, the airport operator can secure patronage from satisfied customers. And one satisfied pilot courts another. So, if you really want to go into the airport business, dig out those visionary communities. Your future will be as great as you make it.

What are the services airminded America wants? First of all — planes. The demand for the plane you distribute will determine your income from this source. Sales is married to Service. Service assures income, for every plane requires maintenance, inspection and repairs. It is a must for the operator to offer these facilities. Next, Sally and Joe are going to want to fly. Instruction is another item of profit. Keep in mind, too, that there is profit from the sale of accessories, gasoline, oil, hangar and plane rentals, sightseeing trips and charter work. How about a refreshment stand, or a small lunch room? Sure, it will take planning to develop tomorrow's airport, but rising profits will be the reward.

Now, let's go back to that western community with ambition to be an outstanding port of call. They know there are two factors contributing to a successful operation. First, the people in the community must be progressive and airminded. A good job of selling can build and retain this aeronautical frame of mind. Secondly, they have found that ther big obstacle is finding an energetic, capable airport manager and operator. This community is prepared to keep its citizens interested and to keep them talking about flying. But how can they assure themselves of a vigorous program unless they merge with the right man and together build this airport which will put them on the airway map? This community needs a business man who will take an interest in teen-agers, middle-agers and oldsters alike. Herein lies the future of the airport idealized by the community.

Need for Improvement

The airport manager and operator is bound to be one of the leading citizens in the community of the future. This operator will conduct his hangar differently from his haphazard predecessor. He will shun barnstorming and acrobatics in ancient planes, realizing that one minor mishap will set him back in selling the safety of air transportation. He has only to shuffle through the records to know what kind of a manager he does not want to be. Remember the fly-by-night garage mechanics of thirty years ago? He liked to tinker, so he serviced Tin Lizzie. He did all right, in a back-alley sort of way. Then along came a farsighted manufacturer who insisted on proper service for the cars he produced. Gradually and at the operator's expense, mechanics were trained by the factory, thus insuring proper service for the dealer's customers. And just as gradually the dealer took his place on Main Street. Not only did the manufacturer offer the car dealer help, but the wholesale jobber and supplier furnished him with sales and accounting aids that established the automobile business on a sound financial footing.

How about the history of the airport operators? The record shows in too many cases that there were no plans, no sales promotion, no accounting records and practically no outside help of any kind. Is the picture changing? Yes. The operator of the future has access to the experiences of those who have won and lost the hard way over the past twenty years. Aircraft supply distributors are concentrating on the operators, encouraging them to promote the business they have, and urging them to push the sale of accessories by attractive displays. The dealer is realizing that sales fly to his hangar when he shows interest in his customers and encourages more pilots in his trade territory. The alert distributor is adding another feature to his service of dealer accounts. He is devising a standardized, simple accounting program for the operator's

(Continued on page 58)

How electronics helps tell a knock from a boost...

THE MIT-Sperry Detonation Indicator is an engine instrument that discriminates between normal and abnormal combustion.

Through an electronic pickup, it *instantly detects detonation*—popularly called knocking or pinging—in most types of internal combustion engines. And it gives *immediate evaluation of detonation.*

As a result, warning is given at the time trouble *starts* . . . engine life is lengthened . . . mixture may be adjusted so that considerable fuel is saved . . . and the period between engine overhauls is extended.

No piercing of engine cylinders is required. Yet even the slightest detonation is signalled visually, and the faulty cylinder or cylinders spotted.

Use of the MIT-Sperry Detonation Indicator on airplanes results in remarkable fuel savings, longer engine life, greater safety.

The same is true of surface transportation which employs internal combustion engines.

Engine manufacturers find this instrument an invaluable aid in designing and testing. It also permits development of fuels exactly fitted to engine characteristics, thus increasing power output and lowering fuel costs. Also with the Knockometer, a special application of the Detonation Indicator, fuels with superior anti-knock characteristics can be developed and their quality production controlled.

Since 1937, Sperry engineers have been working on the perfection of a detonation indicator. This is but one of the many fields in which Sperry has pioneered in the field of electronic development.

Additional information on the MIT-Sperry Detonation Indicator is available on request.

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Airports Take Time —Start Yours Now!

Many communities need landing facilities now. Despite manpower and equipment shortages, much can be done immediately to start new airports.

By ESTHER H. FORBES

AVIATION enthusiasts, industrial and civic leaders, congressmen, and the Civil Aeronautics Administration are pronouncing the need for a vast network of airports over the country. Many communities are drawing up airport plans with the hope of reaping the economic benefits of aviation.

But most of the planners thus far have been concerned only with postwar projects. They have overlooked one vital fact. This is that any aviation enterprise—the construction of an airport, the development of a new plane type, the start of a flying school, or the opening of an air route—takes time.

If airports are not begun until after the war, they will probably not be ready for flying for another year, or two, or even three. Such a lag would be too great to promote the healthy development of civil aviation, which is considered necessary both for the defense of the country and for the achievement of full employment.

There are now approximately 2,500,000 men in our air forces and almost 1,700,000 more civilians engaged in the production of military aircraft. As cutbacks begin after victory in Europe, the services of many of these men and women will no longer be required. Thousands each month will need employment in civilian aviation immediately—not in two or three years.

Private flying should offer them their biggest opportunity. After the last war, it was the family passenger car, rather than the truck or bus, which developed the largest mass market in the automobile industry. In the same way, the private plane now has the largest potential market in the aircraft industry. If that market is ready for development when this war is over, it can provide jobs in industry for aircraft workers, in flight instruction for pilots and in maintenance and repair for mechanics.

Thousands of Towns Need Fields

There are three major prerequisites, however, for the development of private flying. They are mass demand, better and cheaper planes, and more landing facilities. Of these, the leaders of the aircraft industry now see landing facilities as the big stumbling block. They can't reduce their costs or put improved models into quantity production until they have a fair-sized demand, and they can't create a demand in communities which have no airports.

Today there are only 2,942 civil and military airports on record with the Civil Aeronautics Administration. Of these fewer than 1,600 are open to civilian flying. But the World Almanac lists 16,752 communities in the United States. It is evident, then, that if aircraft employes are to continue to build airplanes, pilots to fly them and mechanics to repair them, thousands of communities all over the country will have to start now to build airports which will be ready for use after V-day.

Shortages of manpower and materials will, of course, prevent full-scale airport development for some time still. But that is no reason to postpone all development. There is no lack of money or of land. Therefore, the first important step can be taken today—the buying of airport sites. The experience of communities that have gone ahead with airport construction during the war indicates that this step alone can advance the timing of postwar aviation at least a year.

Everything about an airport takes time. Although in the war zones the Seabees can land with their bulldozers and level a landing strip before the snipers are cleared from thereabouts, it can't happen that way here at home.

First, the community has to be convinced of the need for a landing field, and this may be a long, hard battle.

Next, the site has to be selected out of the areas available, with due regard for such factors as accessibility, clear approaches, flat ground, good soil, easy drainage, and utilities. Often this must be done in secrecy since land owners might hold out for fancy prices. Pressure might be brought to buy the land of a favorite son, or even stronger pressure against building in the neighborhood of some other local bigwig who would object to planes zooming over his house.

Steps to Follow

Having found a site, the promoters have to arrange the terms of purchase, perhaps with several owners. Then they must raise the funds. This might involve either a municipal bond election or equally slow and complicated dickering for private loans.

Detailed plans cannot well be made until after the title deed, or the long-term lease, is signed. While airports of a given type may look pretty much alike, they must be tailored to the area. Planning without a specific site is about like cutting out a lady's dress without taking her measurements or consulting her preferences.

First come the surveys. Unless the land is unusually flat, a contour map will have to be drawn to determine the earthwork so the expense of grading can be minimized. Since runways must be laid in the direction of the prevailing winds, an expert must be called to plot a "wind rose"—a diagram which encircles a central point and bulges out in the directions from which the winds come most frequently.

The other surveys should be made of the soil to determine the kind of grass the soil will grow and the extent of drainage necessary. Grading and trenching will take care of most drainage problems. It may be, however, that fills or artificial drainage by pipes will also be needed. If possible, an expert should be called in now to discuss just what is required and to draw up the plans. If this is not possible, even the layman can keep his eyes open to spot bad puddles or mudholes after a rainstorm.

Experienced airport managers will tell you it is wise to make an over-all plan from the start, so the location of future buildings, utilities, gas tanks, access roads, fences, and landscaping can be charted. Otherwise the initial construction may have to be redone later or may spoil the ultimate usefulness of the field. This requires a decision as to whether the tract will fill all future needs or whether future expansion is to be contemplated. Either way, there will probably have to be some dickering with adjacent property owners to cut trees and remove obstruction on the approaches. The telephone and power companies may have to be persuaded to lower the inevitable pole line along the highway or else "bury the wires to prevent burying pilots."

All these steps come before the actual construction. So it can be seen that the average community looking ahead to an airport after the war can start this chain of events none too soon if the field is to be ready for dirt to fly on V-day.

With good planning and good management, an airport can soon be made ready for lightplane flying. At Redmond, Oregon, the local CAP squadron, after spending months in preparation, went out on some sagebrush flats one morning with shovels and dirt-moving equipment. By afternoon they had graded two runways and had made the first landings on their new airport. At other points CAP members have made fields flyable within a few weeks.

Usually, however, the airport is not ready until grass has been sown and the sod is well rooted. In the absence of paving, grass is generally essential. Otherwise planes land in a cloud of dust or a spatter of mud. Here, too, preliminary studies can be made now to determine the best type of grass or mixture of grasses to produce satisfactory landing strips in that particular area.

Much Can Be Done Now

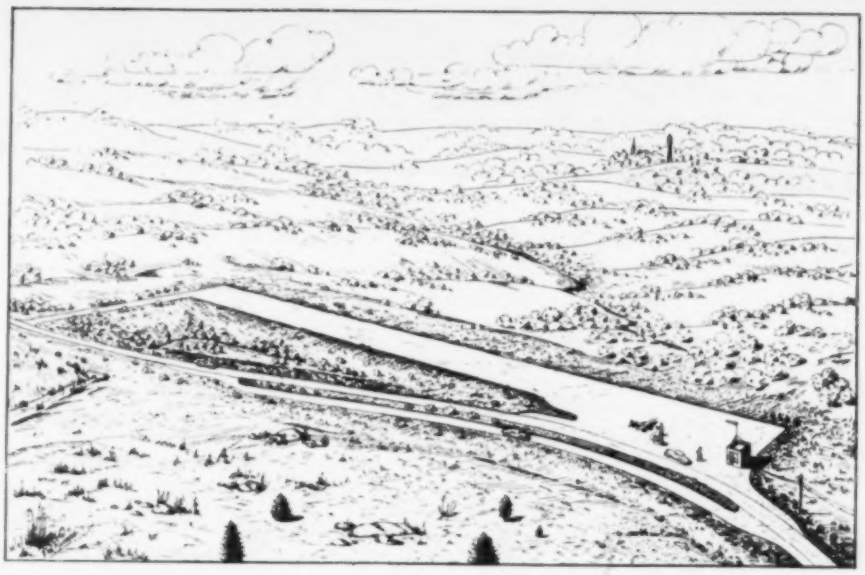
The essential construction completed, local enthusiasts can truck in a gasoline drum, erect a windsock on a pole, set up a shanty for an operations office, and stake down a few planes for local flights. But it is risky to invest in hangars and other improvements until the airport has been officially designated by the Civil Aeronautics Administration, which may require further work in compliance with some specifications that were overlooked.

This stage might well be the goal for V-day. With the volunteer help of local aviation enthusiasts, it can be reached in the average community, large or small, without using critical labor or materials.

Then, with the land bought, the plans drawn, initial grading done and the airport designated, development can be rapid once war priorities are eased. A fixed-base operator can be set up in business. Planes can be bought. Hangars can be built. In a few weeks the airport can be established as a permanent center of activity, linking another town with the national system of air transportation.

Col. Earle L. Johnson, national CAP commander, has a practical suggestion. He points out that many cities are planning world war memorials—hunks of stone on the public square which will do nothing to prevent another war. So, he proposes, "Why not build airports instead as living memorials to those who will come back as well as those who will not return?"

To those city fathers who may take a wait-and-see attitude, it may be encouraging to note that airport building need not be only a patriotic, philanthropic enterprise to promote American air power. Experience shows that it can also be profitable, even under wartime conditions. Where there has been local leadership, little airports are paying their own way even in small communities.



INEXPENSIVE FLIGHT STOP of a type recommended by the Missouri State Department of Resources and Development incorporates one-strip landing facility for ease of installation in hilly terrain. L, T or X flight strips should be used where possible. Such small fields are intended chiefly for emergency use, but once installed can be handily enlarged and improved as the need arises. This one has gasoline pit, tie-down stakes and rope, and coin telephone. The flight strip here is 1800 feet long. The Missouri Department recommends an airpark or Class I airport for all communities of 1,000 population or over, stressing they should build to fit present and immediate future needs first, although allowing for expansion to be developed step by step as it becomes justified.

At Anthony, Kansas, the municipal airport was about to be closed, so Lt. Col. J. Howard Wilcox, the CAP Wing Commander, rented it and hired a flight instructor. To his surprise, so many students, young and old, signed up for flight training that he is now worried about next year's income tax. This is in a town of less than 3,000.

In Auburn, Indiana, a city of 5,700, I. W. Baldwin took over a 67-acre airport in similar circumstances. A former Army instructor was hired and in a short time he had seventy-six students of ages from thirty-seven to sixty-seven. The field is giving full-time employment to local business men who see a future in it and already have put the operation into the black.

For immediate action the CAP has been outstanding. In its own quiet way it has just gone ahead building airports, showing the country that it can be done even with the most adverse conditions.

According to the CAP League, the experience of CAP indicates that communities of as little as 2,000 population can build and maintain airports as sound local projects without any outside help. If this is so in wartime, when the acute shortage of airplanes makes it impossible in many cases for operators to sell as much flight time as their customers demand, it may be concluded that no community need be without an airport after the war. Then plenty of planes will be available, and it is certain that many who have flown or worked around airplanes in the war will want to continue flying in peacetime.

So far, the emphasis of the orators and planners has been on elaborate Washington-sponsored projects to be spread over the first ten postwar years. Some observers fear that although states and communities have more money in reserve than ever before, the hope of government handouts may deter them from spending their own funds. When the fighting airmen come back from overseas they will give no thanks to the city fathers who failed to look ahead and have an airport ready.

It is not only the smaller towns which have hitherto been inaccessible from the air that need to begin active airport planning today. Many of the big cities with large municipal airports for commercial flying will also want small airparks to accommodate private flying. These cities, too, should get under way now with the time-consuming preliminaries if they hope to start flying reasonably soon after V-day.

The Civil Aeronautics Administration has warned that land booms in many areas after the war may raise land prices and may take many of the best airport sites available today. There is no time to lose. Upon the steps taken before the war is over may depend the timing of postwar development and thus of the maintenance of American air supremacy in a world of air-minded nations that will not be idle. ★ ★ ★

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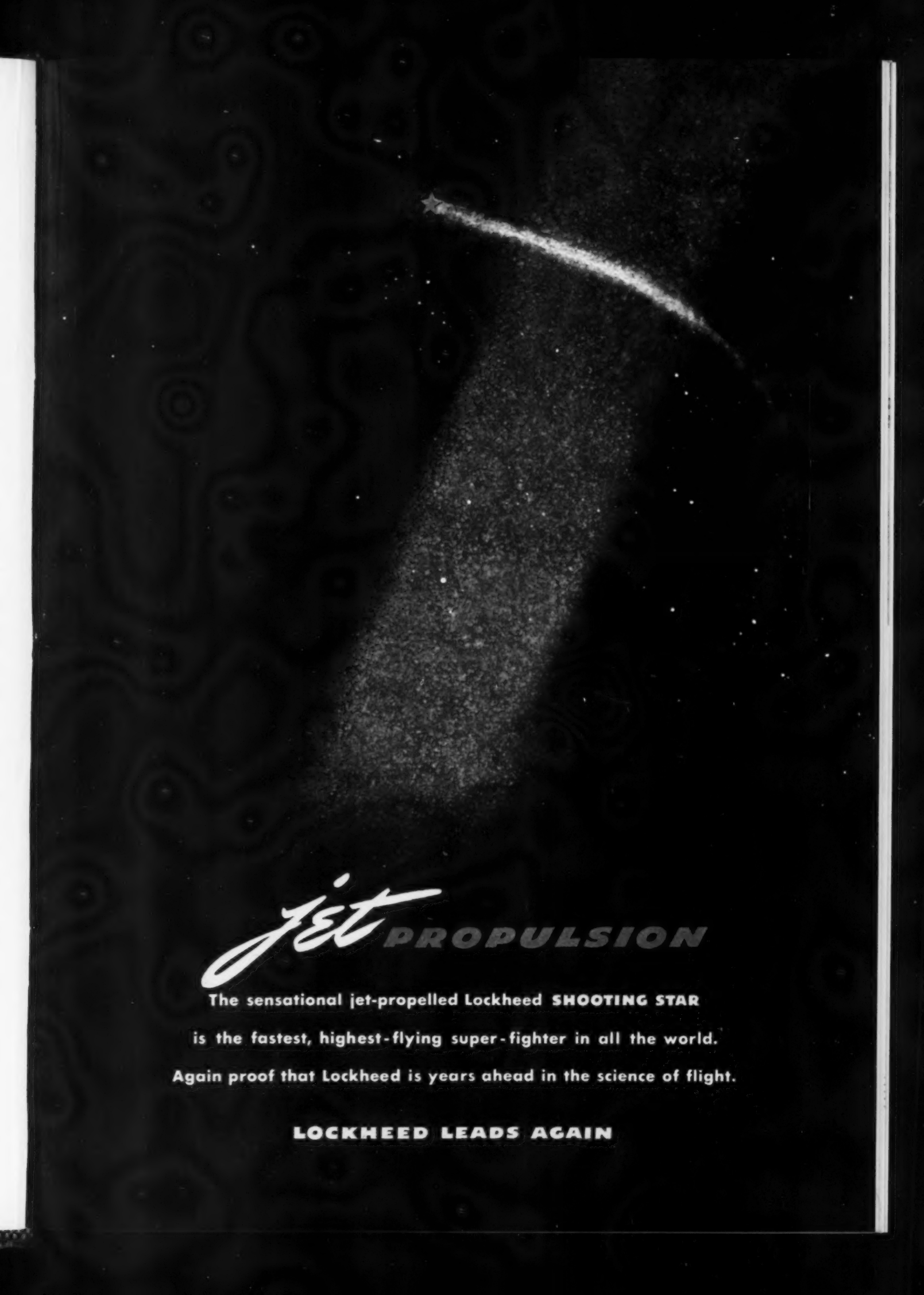
Jet PROPULSION
The sensational jet-propelled Lockheed SHOOTING STAR
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Again proof that Lockheed is years ahead in the science of flight.
LOCKHEED LEADS AGAIN

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Lockheed P-80 Production Supervisor

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LITTLE-KNOWN FACTS ABOUT

Jet PROPULSION

(1) Most common misconception concerning jet propulsion is the idea that forward thrust of the airplane is obtained by the rush of hot gases from a narrow opening pushing against a cushion of air behind the plane.

(2) The jet principle derives from elementary physics: *to every action there is an opposed reaction which is equal in force and opposite in direction.* For instance, (see the above diagram), explosion (A) creates equal forces (B) and (C).

(3) In jet propulsion force (B) is the impelling force of the airplane. It is captured by the front end of the jet engine. Force (C), although equal, is dissipated as compressed gases escape through the narrow jet opening at rear of the plane.

(4) The entire motion of the jet-propelled airplane is caused by internal pressures. Air resistance opposing this movement is minimized by advanced design, such as that incorporated in the Lockheed Shooting Star.

LOCKHEED

LOOK TO *Lockheed* FOR LEADERSHIP

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A Traveler's Report on Airport Neglect

Turning critical, the author points out faulty airport conditions. There are excuses in every case. But patrons don't always understand. Corrective steps are needed.

By JOHN H. FREDERICK

HERE are some things noticed at various airports around the country during the last month. Some of them are not the business of airport management; others of them are. But all of them, particularly the bad, may be **blamed** on airport management by the public using these airports. It is too bad there weren't more good things to mention. It is, in a sense, shocking that so many simple things are neglected but it must always be remembered that the average person doesn't differentiate as to the responsibility for operations on an airport. He doesn't stop to think whose is the responsibility, whether airline, airport manager, private flier, or operator.

Atlanta

The dirty waiting room with insufficient seats. (There were three Eastern Airline flights and one Delta held on the ground while Air Traffic Control located a couple of Army planes that were "lost.") One often wonders where some of the airport administration plans came from. Atlanta people surely must have used an old jail plan. Jails are supposed to be hard to get out of. So is the Atlanta terminal building with one narrow little door leading into a high walled sort of a bull pit with spiked walls not suitable for sitting, leaning, or putting coat or briefcase on. Then the single narrow gate onto the ramp and with four flights called almost simultaneously the congestion here was naturally something.

Atlanta does have a couple of the most spacious airline ticket counters seen for some time with apparently plenty of room to expand. But their lunch room! Actually the poorest cup of coffee ever encountered in long years of drinking hot water to get a little of the brew. (Man from Cincinnati agreed with me and he had been in the terminal all night wistfully trying one cup after another.) Like most airport lunch rooms, this was filthy too, with waitresses quarreling as to whose customer one was and with uniforms too dirty to mention. (Perhaps all of this due to it being about 5:30 in the morning.) But airports carry on business twenty-four hours per day. The public, traveling and otherwise, frequent them for all those hours. There is no excuse for sloppiness, poor service and filth at any time.

Then too, why not tell passengers how long it may be before their flight may depart. A two-hour wait in Atlanta airport could have been more pleasant for many, enabling one mother, for example, to give her baby a much needed change had she been able to get a word from anyone as to how long the wait might be. Instead all she could get was "We don't know, but it may be any minute now." Even railroads provide notice boards to tell when a train may depart.

Jackson, Mississippi

A small town airport apparently excellently run. A beautiful administration building, adequate ticketing facilities, rest and waiting rooms. Even a passable lunch room which might do credit to a bus station, but the building was spotless inside and out, except for the lunch room. The ramp and equipment were in good order with grass and shrubs trimmed and no old papers blowing around. Tried to see the airport manager who had an office suitably labeled, but he was out. Wanted to compliment him on general air of neatness and responsible activity.

Dallas

Well, well! From somewhere the airport manager has dug up some more seats. In case you haven't noticed them go up on the balcony. But this toy waiting room and administration building still typifies the short-sighted airport facility planning of several years ago. Crowded, people falling all over each other and each other's baggage. Dirty, sloppy lunchroom but crowded! Crowded not by passengers but by the night crowd of Dallas—no curfew for this spot—open all night, hence passengers can't even get inside for a "coke." (This observation at 1:30 A. M.)

At another time—about 3:30 P. M. —too much of an air of confusion. Too much rushing around on the ramp. Too much delay in unloading and getting passenger baggage through to taxicabs. Twenty minutes for one flight from Chicago by actual timing! (Baggage was unloaded and piled on truck left standing on ramp for eleven minutes, then porter after porter came out and took off single bags—all this on ramp. Finally some porter, evidently with more authority than the others, wheeled it into the baggage room and those who had not thought to grease certain palms in the proper fashion got their bags.) Is this airline or airport mismanagement? Probably the former, but the passenger doesn't blame it on airline. He or she blames it on Dallas!

Austin

Crowded, dirty terminal building. A disgrace to the capital city of Texas. Hangers-on monopolizing the waiting room chairs — looking as if they ought to be attending to their business somewhere else. The long wait for baggage even when only one or two bags to come through.

Cowtown

Where the West begins but the local color is gone! Where, oh where is the moth-eaten longhorn steer which formerly graced the center of the waiting room? One of the poorest arranged set of ticket counters in any airport in the country. Hard to tell where Braniff, American and Delta begin or end. Passengers falling over each other at the wrong spots. American doing Braniff work and vice versa —or so it seemed—the night this observation was made. Lunch room only open certain hours — small comfort to those on flights passing through during the shut-up periods! Again not enough seats. No taxicab service for the private flier—often waiting twenty minutes or more for a cab.

San Antonio

Just temporary administration building at this time. Smart! Who knows what will be wanted when the war is over? One of the best airport restaurants in the country. Am told Army people fly in for lunch from many miles around—rather costly for the taxpayer but suppose they get practice at the same time. Some good seats **outside.** Why don't more airports think of this? Seats in the shade too! Fine system for handling baggage promptly.

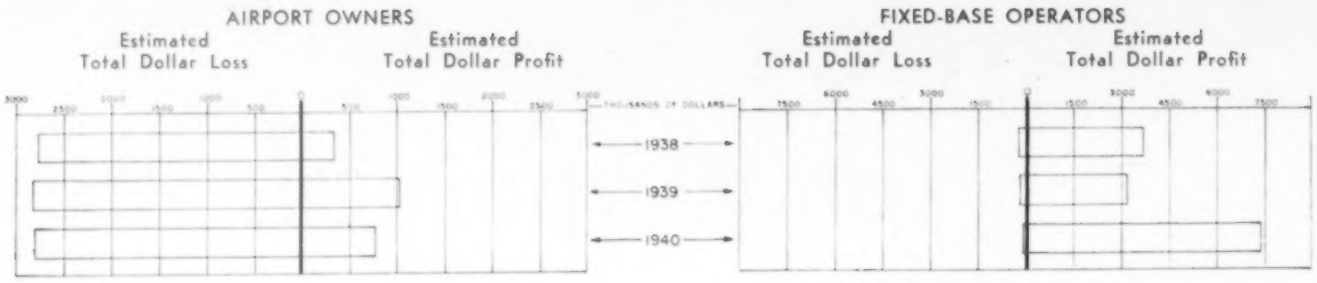
Chicago

Confusion compounded!

Des Moines

A sad situation! Lots of airline and private flying business but an ad-

(Continued on page 54)



REPORT ON NEGLECT

(Continued from page 53)

ministration building largely monopolized by flying schools. No room for Mid-Continent to operate a suitable waiting room. (Actually about nine by ten feet.) Fortunately it was not raining. One shudders to think what it must be on a rainy day with no protection for passengers except in this little room. Poorly arranged ticket counter, particularly as to baggage weighing. But Mid-Continent certainly has worked out the checking-in process. If you already have your ticket before you reach the airport they know it from the time you have confirmed space or bought it downtown—so your baggage check is all made out, tag for your coat all made out before you get there, and it is only a matter of entering your personal and baggage weight on the manifest otherwise prepared. If you don't have a ticket one is made out before you reach the airport, too. The checking-in process takes just a minute or two which is about all one can stand in such a small and crowded space. Rest rooms inadequate and filthy.

Kansas City

The first chance to eat in the famed airport restaurant. And it is famed with good reason! But too crowded with Kansas City people—met some old friends who live there and "eat here two or three times per week; they have the **best** steaks but not on the menu." Can't some way be worked out so the air passenger, stuck here between planes with no likelihood of being fed on the outgoing flight and no time to go into town, even though it is but a few minutes ride, can get service? It probably is one of the best places to eat in Kansas City but who is the service provided for, local folk or the passengers? (Of course from an income standpoint it makes no difference whose dollars they are as long as they roll in but it would be nice for the passengers not to have to stand in line and then rush for fear they won't get through.)

Waiting room spacious but not enough seats. Excellent system of keeping enplaning, deplaning and other passengers off the ramp and out of the way of baggage and mail handlers. Everyone but workers herded into waiting room and kept there. The large glass doors are locked and under guard of attractive uniformed young women. Not opened until plane departure is announced. Ticket counters somewhat crowded. Better and cleaner rest room than at most places. From these observations certain points stand out for the attention of airport management and the airlines, whichever is responsible:

1. Airports are too dirty. This is management's affair. No matter what kind of building you have you can sweep it night and day. You can have the ramp kept orderly and clean, too.

2. Airports do not have enough places for passengers and others to sit down. This is management's affair, too, but partly due to the types of buildings they have to struggle with where there may be really no room for more seats.

3. There is too much rushing around in many airports particularly with several planes on the ground. There is no excuse for any employe of airline or airport **running** at any time except in case of fire or accident. An air of confusion creates just that in the minds of many passengers and others. They wonder if this business of flying is as safe and sure as they would like it to be.

4. Airport lunch rooms are mostly terrible. This is distinctly management's affair but one wonders how long the airlines will put up with what their passengers have to stand without taking a hand.

5. There is too much uncertainty in the minds of passengers and others as to just when flights will arrive and depart. Why can't more airlines or airports follow Braniff's example in Dallas and establish a simple announcement board giving expected arrival and departure times?

6. There is too much baggage delay for incoming passengers, which is partly an airline and partly airport management problem.

Airports are very vital to commercial and private air transportation. Airport managers should keep airlines and other users of their facilities "up to snuff" and airlines should not put up with sloppy management. In airport management today there is a division of responsibility and authority leading to many of the poor conditions noted here, or at least preventing their being corrected.

Perhaps we can learn something from the railroads where they run their own stations, even union stations. Some system of authority must be worked out. Someone will do it sometime. From the professional standpoint it would be better if airport management did it, but first many of its faults must be corrected. Then those of the airlines can be attended to. The aim should be to have an airport where nobody, commercial airline traveler or private flier, can so easily observe shortcomings such as those recorded here. ★ ★ ★

PROFITABLE AIRPORTS

(Continued from page 43)

ing facilities. At larger fields this is usually divided between a dining room, overlooking the runways, which serves the best of meals; a cafeteria for more hurried and less expensive eating; a soda fountain serving sandwiches, candy, and tobacco. Newsstands, with a sideline of novelties, also provide a steady revenue.

These particular concessions should be leased under a definite clause demanding clean and sanitary conditions, with food being sold which can meet the most rigid inspection, and at reasonable prices.

Automobile parking space can be leased to sight-seers, aviation enthusiasts, and others who visit airports for curiosity; space for airplane pilots and passengers should be free of charge.

The spectator ramps at both Washington National and LaGuardia airports have proven splendid revenue producers. Ten-cent turnstiles are used; thousands of dollars are paid annually into the turnstiles permitting visitors to see the entire operation on the field. While not applicable in very small fields, this source of revenue can be developed in many medium-sized airports which are currently neglecting it.

The usual vending machines, selling everything from gum to music, are sound investments in airports both small and large as they are in all public buildings.

Aggressive business management can increase all types of airport revenue. Through concessions, rentals to mechanic shops, flight instruction schools, air carriers, and other allied industries, sale of gasoline, and other service, it is possible for proper management to prosper with the new and expanding business of sky transportation. Without such management the investment of Federal and local governments in airport construction will fail to provide adequate revenues and an inevitable reaction against the provision of adequate ground facilities for aviation will result. ★ ★ ★

★ AIRPORT MERCHANDISING ★

By DUDLEY M. STEELE
Manager, Lockheed Air Terminal

CONVENIENCES for the public who patronize an airport, whether municipal or privately owned, is the fundamental upon which your thinking should be predicated. If we keep the foregoing in mind and try to analyze what we can do around an airport to make it more convenient for the users thereof, 98 per cent of which are the public, then we have a good foundation upon which to build. This time we are going to talk about those conveniences which the public expects at places where large numbers congregate for the purpose of transportation.

Before we start, however, let's clarify certain fundamentals of thinking regarding revenue on an airport from sources other than flying. When a private corporation or a municipality invests from a few hundred thousands to many millions of dollars in an airport, the private corporation particularly must have a return on its investment; the city should have. After the airport has been constructed, various and sundry individuals and firms will wish to do business thereon. Naturally they expect their efforts to return a profit to them. It is this writer's belief that, before such individuals or firms are permitted to engage in business, they should enter into appropriate leases with the private corporation or the city in the terms of which a certain portion of their gross or net profits are paid to the airport as a fee for conducting their business on the airport. This can be termed as rent, license fee, or simply a charge for the privilege of doing business. With this basic fundamental fact in mind, the writer will now discuss some miscellaneous items which produce revenue for the terminal which he operates.

Public Telephones

The need for a public telephone on an airport is so obvious that it is unnecessary to elaborate on it here. Many airports, however, have from one to ten or twelve such public telephones from which they receive no revenue. We have an arrangement at our terminal whereby the telephone company at its expense installs telephone booths in our lobby, at our service station, garages, and various other outlying points. Once every month, or oftener, they collect all of the coins deposited in the telephone boxes and they return to us 15 per cent of all such money collected. There is no differentiation between the money spent for a local or a long distance call. It is not necessary in the majority of cases to enter into any agreement with the telephone company other than a simple letter of intent. Those who are not now collecting some portion of the amount left in telephone boxes can easily do so by approaching the telephone company in a tactful manner. To those who still may be without telephones or who do not have a sufficient number, this is to advise that the public finds it greatly to their convenience to have a telephone available and to have sufficient of them to avoid long delays. Many times an important telephone call must be made with only minutes before departing on a plane.

Telegraph Facilities

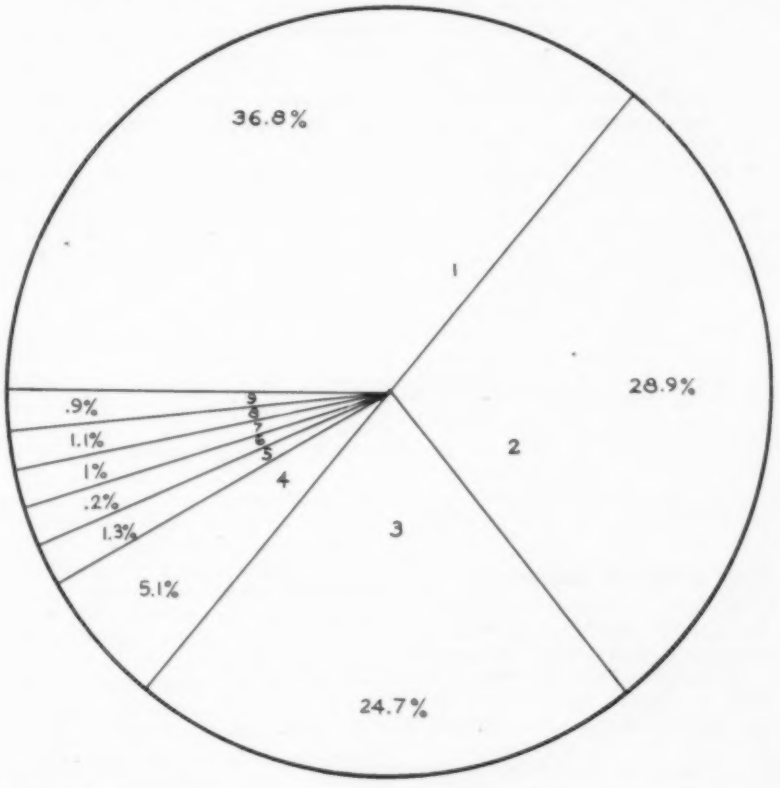
This is another service which the public expects and which is a great convenience to them. Again, in some cases, no revenue is received by the airport from the telegraph company for the privilege of receiving and transmitting telegrams and cablegrams to points all over the world.

We have found that the telegraph company will pay a reasonable rent for the small space necessary for their use. Ten per cent of the gross business for telegrams received collect and sent paid from the space allotted is a fair rental basis. Care should be taken, if request is made for a flat rental basis, to compare that figure with 10 per cent of the gross business for an average twelve months prior. If such a comparison is not

(Continued on page 58)

DETROIT'S AIRPORT REVENUE DOLLAR

An analysis of revenues by Don Martin, manager of the Detroit City Airport, produced the excellent "revenue dollar" shown below. Only a casual glance is necessary to determine the chief sources of revenue to the Detroit Airport and, more importantly, to note its healthy financial condition. Merchandising and balanced sources of revenue make the Detroit Airport one of the most efficiently-operated airports in the nation. One of Manager Martin's greatest accomplishments has been the development of adequate income from sources other than the airlines, which generally are considered the major sources of revenue for airports.



1. Hangar and Space Rentals	$83,050.00	6. Barber Shop and Western Union	$ 450.00
2. Airlines	65,000.00	7. Electricity	2,200.00
3. Sale of Gas and Oil	55,500.00	8. Commercial Flying Fees	2,500.00
4. Restaurant Concession	11,500.00	9. Parking Lot Revenue	2,100.00
5. Vending Machines	3,200.00		$226,000.00

Students in airport operations and management at Texas A. & M. College use this excellent airport as their laboratory. It consists of approximately 800 acres and has three concrete runways each 150 feet wide and 5,150 feet long. In addition there are parallel sod runways.

College Training for Airport Managers

By DEAN H. W. BARLOW
of The A. & M. College of Texas

IT is recognized that in most quarters one of the great needs of the aviation industry today is for airport managers, and the feeling persists that none of the training courses so far proposed meets the needs adequately. Training programs and courses in the past have usually been designed to fit men for airport operations work at large fields. Sufficient attention has probably not been given to the training of men as managers of small fields. Inasmuch as this particular division of the industry will absorb a greater number of men in airport management work, it is highly desirable that a new training course be developed for this particular job.

In view of this, the A. & M. College of Texas through its Aeronautical Engineering Department and Department of Industrial Education, has established a course in Aviation Operations Management. The course will last for two full years divided into three terms per year. Approximately one-half of the time in the course is devoted to laboratory and shop work while the other half is devoted to class room lectures and demonstrations. More than half of the students' time will be spent at the College airport.

Wide Range of Subjects

Each student will take sufficient work to qualify him for the CAA examination for aircraft and aircraft engine mechanics license. He will also take work in report writing, public speaking, public relations and sales in order to equip him for the necessary work to be done in conjunction with government agencies and the public. He will also take certain background subjects in technical fields such as applied mathematics, applied physics, applied chemistry, surveying and technical sketching. These will lead to courses in airport structures, airport layout and equipment evaluation. Since the airport manager must know something about economics, law and accounting, he will take work in economics, business law, airport maintenance and airport accounting. A special course in airport accounting is now being developed and will be used in this course for the first time. Additional courses in supervision and safety and American government round out the program.

This course will prepare a man to take the position as manager of the small or medium-sized airport in which he may have to be chief mechanic, as well as bookkeeper and accountant and airport manager. It is the type of course that will establish an individual in such a position that he may open a business of his own and be reasonably self-reliant. It also prepares a man adequately for management of small-town or small-city airports. The practical angle of this training program is stressed to a very high degree and the students will learn by doing all jobs necessary at a well-run airport.

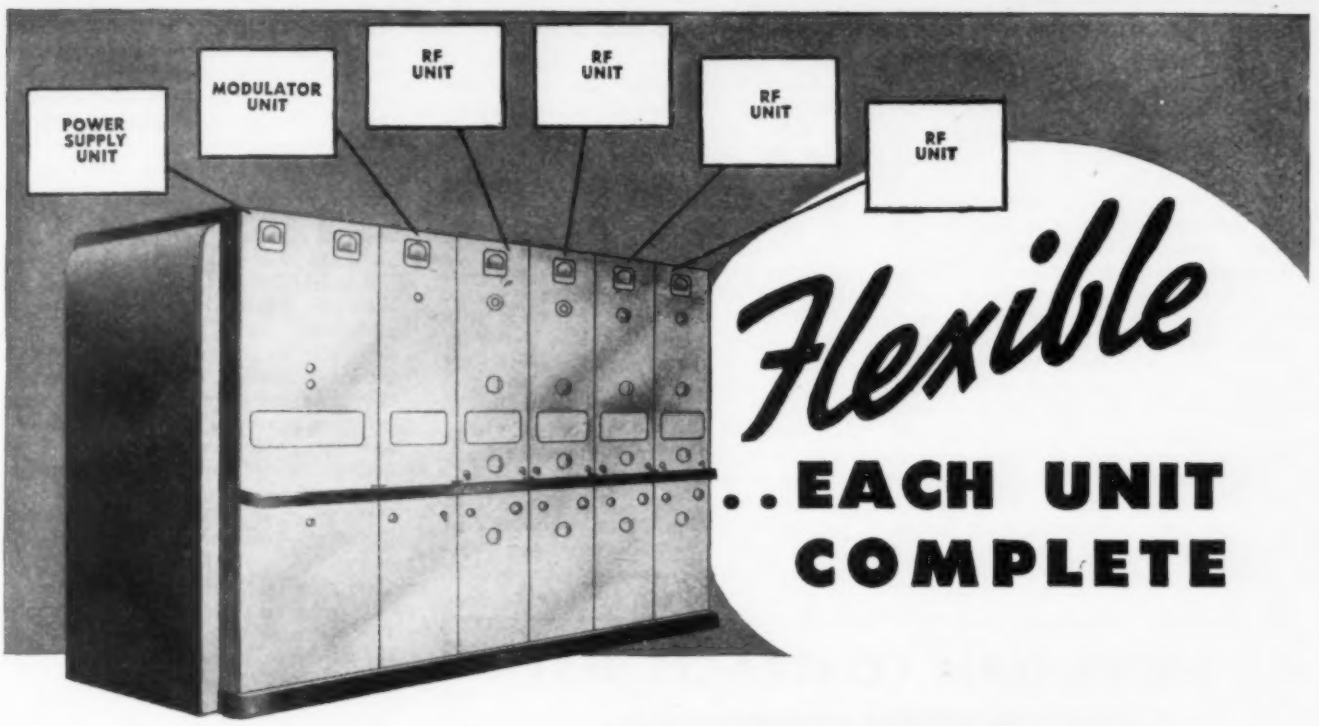
In addition to the work in mechanics and technical subjects, the student will be permitted to take as much flight training as possible. In accordance with some of the terms of the G. I. Bill he will be able to take a certain amount of flight training and it is hoped that he will at least be able to secure his private pilots license. Students enrolled under part VII of the Veteran Training Bill will probably complete the commercial instructor flight program. All this is available on the College airport.

Elaborate Facilities Used

All of the facilities of the A. & M. College will be available for this course. The College-owned airport is one of the finest in the U. S. It consists of some 800 acres and has three concrete paved runways, each 150 feet wide and 5,150 feet long. In addition there are parallel sod runways. Concrete taxiways, fifty feet wide, parallel all of the paved runways. The field has excellent drainage and is located a mile and one-half from the campus. At the present time the College owns seven airplanes of various categories, and is now constructing the largest wind tunnel in the Southwest. The Aeronautical Engineering Department which assists in sponsoring this work is one of the largest of its kind in the country and has all the facilities which are needed for conducting this particular kind of work. The Industrial Education Department which co-sponsors the training has been responsible for an extensive training program throughout Texas dealing with industrial supervision, foremanship and safety. At the present time these two departments are co-sponsoring the training course for A. & E. Mechanics.

It is to be emphasized that all of the College facilities, particularly the airport, will be used in this program. Students will work on airport management problems using their everyday experience at the airport; that is, the entire airport will serve as a laboratory and students will have the opportunity of working out the day by day problems of the airport manager on a larger field in the connection with an active operation.

Although this course is planned particularly for returning G. I.'s who are interested in participating in this new field of endeavor it is likewise open to civilian trainees. It is necessary that all trainees be nineteen years old and be high school graduates or have the equivalent education upon enrollment. The next course will start just prior to June 1 and any person who is interested should address communications to the Dean of Engineering at the A. & M. College of Texas, College Station, Texas. ★ ★ ★



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For airway and airport service, this newly designed product of RADIO RECEPTOR engineers and craftsmen represents the most advanced practice. This transmitter is intended for use at an airport for communication between ground and plane, or between two airports of an airway system for both long distance and local communication.

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The transmitter assembly is composed of individual units, one for each RF channel, one for each modulator, and one for the rectifier power supply unit. The RF and modulator units are interwired and connected to operate from the common rectifier power supply unit.

FREQUENCY RANGE—2 to 20 mc. RF units are supplied with coils and capacitors to operate at a single specified frequency and output load. Components are available for operation on any other frequency and output load impedance within the limits specified.

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FREQUENCY CONTROL—Low temperature coefficient crystal control at a sub-multiple of output frequency.

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TYPE OF TRANSMISSION—A-1 (CW Unmodulated telegraph), up to four simultaneous channels: or A-3 (telephone Modulated carrier), up to two simultaneous channels.

MODULATION—High level modulation of RF power amplifier by means of Class B audio modulator.

NOISE LEVEL—Carrier noise 40 db. below 100% modulation.

KEYING—High speed (200 words per minute) electronic keying standard. Slow speed keying of oscillator available on special order.

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AIRPORT MERCHANDISING

(Continued from page 55)

possible, as it would be in the case of a newly constructed airport, then the best way to handle the matter is on the 10 per cent basis for at least one year, making a short term lease only. Be very careful and do not tie yourself up with a long term lease unless you put in a provision for renegotiation at the end of some reasonable period, say two or three years. In connection with leases to the telegraph company, it is their obligation to install all wiring, counters, etc., needed in their operation at their expense and furthermore their counters should conform to the architecture, type of wood and decoration used within your lobby. The last is mentioned because sometimes for economy purposes they might wish to install fixtures which would not harmonize with the balance of the lobby.

Barber Shop and Showers

A barber shop is practically a necessity at large air terminals. Thousands of passengers leave cities at night and arrive at their destination the following morning. Many find it a great convenience to be able to have a shave, haircut, shine, and an opportunity to take a shower, change linen, and freshen up before keeping early morning appointments. It is surprising how many men arrive in the morning, expect to spend only that day in your city, and leave by plane late in the afternoon or evening. The convenience of your barber shop makes it unnecessary for them to worry about hotel accommodations and saves them a great deal of time.

Again, when talking about major air terminals, there are hundreds of employes—airline, commercial operators, and terminal employes—who naturally will patronize this facility. We here feel that the proper way to handle such a business is to provide the room in which the barber shop is located, requiring that the operator thereof provide the barber chairs, the lavatories, all shelving, cabinets, and mirrors, as well as floor covering. As rental for the premises, we receive a percentage of the gross receipts, auditing his cash register weekly. In addition, we make a lease covering the premises for a period not to exceed two years and an option for an additional year. All electricity, gas, and hot water is furnished by the terminal without charge to the operator of the barber shop. We maintain the premises, keep them painted and in good condition, except for negligence on the part of the lessee, while the lessee himself is responsible for the cleanliness of the premises, including frequent washing of windows.

Originally the barber shop here at our terminal held only three chairs. The operator was quite skeptical that the business to be had would justify this number of chairs. Within thirty days it was necessary to install a fourth chair. Even then he lost a great deal of business through his inability to serve his customers with the result that we have provided larger quarters where he now has seven chairs, a double shine stand, lavatories, showers, and facilities for electric shaving if the customer so desires. Lockers are provided for the clothes of customers desiring to take showers.

That's all for now. See you next month. ★ ★ ★

SHORT-TERM CONTRACTS BEST

By AIRPORT OBSERVER

A STUDY was made of thirty airline contracts at the following Southwestern cities: Austin, Abilene, Brownsville, Corpus Christi, El Paso, Dallas, Houston, Laredo, and San Antonio, Texas; Shreveport, Louisiana; Little Rock and Texarkana, Arkansas; Tulsa, Oklahoma; Santa Fe, Roswell, and Carlsbad, New Mexico. It was apparent that the long-term leases produced less revenue than did the short-term leases, and so the following tabulation was prepared:

Term	Number of Contracts	Total Fees	Total Landings	Av. Fee Per Landing
1 mo.	5	$13,747	5,369	$2.56
1 yr.	4	8,600	4,148	2.07
2 yr.	4	11,571	11,407	1.01
3 yr.	3	6,800	3,615	1.88
5 yr.	4	6,300	2,512	2.51
10 yr.	2	1,560	6,935	.22
12 yr.	2	600	2,600	.23
20 yr.	2	2,000	11,711	.17
25 yr.	1	250	1,013	.25
30 yr.	1	2,925	730	4.00
32 yr.	1	0	5,280	0
35 yr.	1	4,693	9,253	.51
	30	59,046	64,573	.91

Summary

Short Term Leases

Term	Number of Contracts	Total Fees	Total Landings	Av. Fee Per Landing
1 yr. or less	9	$22,347	9,517	$2.34
2 yr. or less	13	33,918	20,924	1.62
3 yr. or less	16	40,718	24,539	1.66
5 yr. or less	20	47,018	27,051	1.74
Average per lease		2,351	1,353	1.74

Long Term Leases

Term	Number of Contracts	Total Fees	Total Landings	Av. Fee Per Landing
10 yr.	2	$ 1,560	6,935	$ .22
10-12	4	2,160	9,535	.23
10-20	6	4,160	21,246	.20
10-25	7	4,410	22,259	.20
10-30	8	7,335	22,989	.32
10-32	9	7,335	28,269	.26
10-35	10	12,028	37,522	.32
Average per lease		1,203	3,752	.32

SMALL TOWNS

(Continued from page 44)

use. He is valiantly trying to take the red ink off the desk of the dealer and replacing it with the black ink of good business.

Today it is less difficult to answer the question of where aviation is heading. If a sizeable, airminded community backed by men with vision has a dynamic, enterprising airport manager-operator who has a working knowledge of sales and service, and you add the essential sales and service help of the aircraft manufacturer plus the regular contacts, accounting and merchandising aids from the aircraft supply house, the result can logically be the airport envisioned by energetic city fathers. ★ ★ ★

Airport Construction

Construction awards by the Chief of Army Engineers announced last month included:

RANDOLPH FIELD, TEXAS—J. W. Bateson, Dallas, Texas, for construction of hangars at Randolph Field at a cost of $443,980.

TOPEKA, KANS.—Bowers & Lundgren, Topeka, for construction of hangar, oil storage, etc., at Topeka AAF at a cost of $183,239.40.

AIRPORT EQUIPMENT

Snap-on Lenses for Portable Beacon

A portable rotating beacon manufactured for the U. S. Coast Guard has possibilities for airport employment. Its twenty-four-inch face is equipped with a variety of snap-on lenses, shutters and mountings to permit functions as an airport beacon, either rotating or fixed, a floodlight, a range light or for signaling. Although it can be mounted on a tripod or other handy base, the beacon assembly was designed for installation on a one and one-half-ton truck carrying generator, auxiliary equipment and parts.

Carbon Dioxide for Oil, Electrical Fires

A new fast-acting portable fire extinguisher, known as the Alfite Speedex, has been approved by the Underwriters and Factory Mutual Laboratories. Available in three sizes, it uses carbon dioxide as the extinguishing agent and was designed to more speedily extinguish small oil or electrical fires. Three sizes are of 4, 10 and 15-pound gas capacity.

Elaborate Booklet Aids Missouri Planning

An elaborate and instructive booklet has been published by the Missouri State Department of Resources and Development for the guidance of communities planning airports and to encourage a development of a comprehensive network of airparks, flight stops and airports in that state. It details in simple language such steps as the organization of local airport committees, selection of sites, evaluation of airport needs, types of facilities and their requirements, importance of proper management, etc.

EQUIPMENT SERVICE

Readers desiring full details concerning Airport Equipment and Airport Literature are invited to address postcard requests to
MODERN AIRPORTS
P. O. Box 750, Dallas 1, Texas

Compact Cart for Lubrication Service

A compact, portable lubrication department on wheels has been announced. The unit, named Lubrikart, transports and dispenses a variety of grades and types of lubricants. It is mounted on five-inch ball-bearing casters and is twenty-one inches wide. Pushed like a perambulator, it is intended for one-man operation and is able to travel between rows of machines or elsewhere that space is limited.

State Legislative Survey

A tabulation by the National Aeronautic Association shows eighteen states have enacted aviation agency laws while thirteen others are still considering such measures; twenty-five states have adopted airport enabling legislation, which is pending in eight others; airport zoning bills have been approved by eleven states and are pending in three others, and legislation relating to aviation gas taxation has been enacted in seven states and is being considered by eleven others. Over half of the forty-four state legislatures scheduled for sessions this year have completed their work.

Control of Southeastern Air Service Bought by Ben T. Smith

Controlling stock in Southeastern Air Service, Inc., of Atlanta Ga., one of the nation's leading aircraft sales and service firms, has been acquired by Ben T. Smith of Atlanta, formerly vice president in charge of service operations. He purchased the interests of E. Cody Laird and H. T. Dobbs, who have resigned. Expansion is planned for Southeastern's operations at Atlanta, Athens and Macon, Ga., and its associate bases in the Carolinas and Georgia.

New Catalogue on Hangar Doors

Byrne Doors, Inc., has issued a new catalogue describing its stock. Included in the booklet are descriptions, specifications and operations of Type K and B canopy doors; motorized slide doors, for extra large hangars. Also described are industrial doors, canopy doors for private plane hangars, crane entrance doors and moveable steel partitions.

N. Y. Hires Director

Major Leslie A. Bryan of Syracuse, World War I pilot, Civil Air Patrol leader and president of the New York State Aviation Council, has been named director of New York's new Bureau of Aviation at a salary of $6,500 annually. His assistant, William E. Cullinan, Jr., will serve as airport engineer at a salary of $5,200 annually. New York now has 112 airports and eight seaplane bases in operation, and twenty-seven airports in the state are closed for the duration. A plan for new airport construction is being formulated.

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COMMUNITY CENTER FOR FLYING AND RECREATION has been projected for the City of Evansville, Indiana, previewing a postwar trend in municipal airport development. The layout, prepared by Albert Kahn Associated Architects & Engineers, Inc., shows swimming and wading pools, tennis courts, picnic tables, skating rinks, outdoor dance pavilion and other features. The plan is part of a proposed expansion of the present Evansville Airport and the entire project, including a new and novel administration building and other facilities, has been estimated to cost less than $2,000,000.

Revised McCarran Bill Limits Urban Projects

Incorporating a compromise to satisfy demands by both municipal and state interests, a revised version of the McCarran Federal aid airport bill (S-2) has been reported to the Senate by its Commerce Committee and is expected to be immediately passed when it reaches the floor.

Provisions in the new measure limit urban projects to 35 per cent of the total Federal appropriation of $500,000,000, which would be allocated in a five-year program. Previously the urban category was to have been allocated 50 per cent of the total. Class 1, 2 and 3 airports are placed in the state category with Class 4 and larger airports assigned to the urban bracket.

Among several changes in the measure is a new provision, advocated by the National Aeronautic Association, allowing airports to charge "reasonable" rent for space used by government agencies in airport buildings.

Tom Davis on Non-Paid N. C. Aero Commission

Tom Davis, manager of the Smith-Reynolds Airport at Winston-Salem, N. C., has been appointed by Governor J. M. Broughton as a member of North Carolina's non-paid State Aeronautics Commission. Members in addition to him are Roy Rowe of Burgaw, chairman; William Olsen of Raleigh, Mayor Herbert H. Baxter of Charlotte, and Paul McMurray of Fletcher.

Cities Urged to Buy Airport Sites Now

Warning against "competition" from housing developments and rising prices, Charles B. Donaldson, director of Airport Services, Civil Aeronautics Administration, is uring cities and towns to acquire suitable acreage for airports now. He said CAA airport service representatives are eager to assist in the selection of airport sites. "Any sites suitable for airports should be considered now by city officials, because they are also suitable for housing projects and parks," Donaldson said.

Joint Committee Urges Airport Survey, U. S. Control Tower Funds

The Civil Aviation Joint Legislative Committee has recommended a resurvey of national airport needs and is urging Federal appropriations to continue operation of control towers at those airports where such service was installed as a military need, pending final CAA decision as to civilian requirements for the control tower services at airports where military traffic is slackening.

The proposed resurvey of airport needs, urged as needed before any postwar program begins, would take into account the expected transfer of war-built fields to civilian use. William P. MacCracken, Jr., is chairman of the Committee.

Wanted: News of Airport Openings

Does YOUR town or fixed-base operator plan to open a new airport soon? SOUTHERN FLIGHT is receiving notices of new airport openings for its Modern Airports section and would like to include yours in its announcements.

Dream sketches and master plans are a dime a dozen, but actual airport openings and operations make important news for airmen, other cities and towns, and various interests, such as aircraft manufacturers and suppliers, airlines, charter and air taxi operators, etc., who are awaiting new airport openings to expand their services to aviation.

This month's MODERN AIRPORTS cover, page 41, is dedicated to a new airport at Okmulgee, Okla., (see next item below).

Latest announcement received came from Dunkirk, New York, where a $600,000 municipal airport will open on May 30. The field has two macadam runways, each 4,000 feet long and 150 feet wide, and taxi strips. It is equipped with modern lighting facilities, and has a weather communications center. Dunkirk Aeronautical Corp., the operator, has constructed its own 60-ft. x 60-ft. steel hangar for local and charter flying, instruction, sales and service. The field has an administration building accommodating an operations office, pilot's lounge and classroom. Anthony W. Riccio, former Republic Aviation Corporation test pilot, is airport manager. Pilots are invited to fly in for dedication ceremonies.

Send descriptive matter, including photos and layouts of your new airport to the editors, MODERN AIRPORTS, P. O. Box 750, Dallas 1, Texas.

Million-Dollar Airport at Okmulgee, Okla., Opens on May 27

This month's MODERN AIRPORTS cover, page 41, is devoted to photos showing the new Okmulgee, Oklahoma, Municipal Airport's excellent runways and new hangar. Three concrete runways, all connected by paved taxi strips, are 4,300 feet long and 150 feet wide. The field, covering 1,280 acres and equipped for night flying, cost over $1,000,000 and has a new $75,000 brick hangar.

It is conveniently located only one mile north of the city, which is fifty miles south of Tulsa. E. L. Thomas is manager of the airport, and A. A. Hale, an A. & E. mechanic, is in charge of the hangar, where an aircraft service and repair shop is operated. A $5,000,000 government general hospital was recently completed at Okmulgee, and the new airport is frequently used by military aircraft.

Commissioner Wheatley invited private fliers everywhere to fly into the new airport for its opening on May 27.

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THE Sky's the Limit

BY BILL GREEN

How much longer will air transport ignore the small towns? . . . They need and can support feeder airlines. . . . Surplus planes could be used. . . . Aviation development won't be complete without short-haul operations.

Rural America Needs Airlines

WE have shown many times in these columns that small towns are not considered in the national aviation picture up to now. The larger cities can have their airmail and air transport facilities but the hundreds and thousands of smaller cities have none. It's true they can buy airmail stamps and affix them to their envelopes, but it's equally true that the said letters will not reach their destination at airmail speed. It's also true that they can take the local bus or railroad to a larger city, try to get an airline ticket, go to the airline terminal nearest their destination and then ride on a bus or train, and then repeat the same deal coming back. But by so doing, they may have to go hundreds of miles out of their way, pay a considerably larger sum of money and not save any time.

Small towns have a greater percentage of business people than big towns. There are more stores per capita in small towns than in large ones. The reason is that the stores do a lower volume of business than they do in the larger cities. Each of these stores has to do its purchasing somewhere. We personally have known some of the store operators at Midland and Wink, Texas, very small towns not served by airlines, and have found they regularly make trips to Dallas, Chicago and New York to do their fall and spring buying. Those people will fly whenever they can because their time is important and they make good money. Several years ago, we leased our airplane for a certain period of time to a shoe salesman from St. Louis, who covered West Texas and New Mexico. Although he paid us a lot of money for our plane, he told us that by so doing he not only impressed his clients but, by reducing rail travel to a minimum, made his time more productive, and thus made a larger net profit off of his trip. Furthermore, these small towns are the homes of many farmers and ranchmen who, in a good many instances, make real money and are men of the world. We know several people from Midland, Texas, one of the world's outstanding cattle producing centers, who have been in almost every country in the world and who are expert pilots and do not like to travel any other way than by air. We also know that every time an airport is established in one of these smaller places and someone starts giving flying lessons, they are swamped with students.

Let's take the matter of Okmulgee, Oklahoma, as far as airline service is concerned, and consider it. First, Okmulgee is about fifty miles from Tulsa by air but is about seventy-five by road the way the railroads and busses go. There is one railroad train per day each way so that you have one opportunity per day to go either to Tulsa or Dallas, the nearest large cities. The railroad trip to Tulsa takes about two hours and to Dallas takes about ten hours. The train arrives in Tulsa at 7:50 in the morning so that one has to wait until 10:15 to go one direction on the airline, and until 12 to go the other direction. This means that it requires four hours and fifteen minutes to go seventy-five miles in one direction and six hours and something to go seventy-five miles in the other direction. When these times are added to the airline time, it practically means that you could have done much better by going in a car or by going all the way on the train or bus, especially if you consider that both ways the trip is made on time not usually spent in work-day activities. The same thing is true of airmail and, in fact, it is frequently quicker to send mail by regular mail than by airmail to many points. If you don't believe it, just try a few examples.

We are at a complete loss to understand why the airlines and the Civil Aeronautics Board have for so long held back the feeder airline business. The CAB has to have it shown to them that the feeder airlines (1) are needed and (2) will be able to exist.

We would like to ask the CAB here and now what other business in the United States of America is protected against losses in business. We think that is none of their business. The CAB was never set up to insure that all of the people working in aviation would get a profit. In fact, the government has never interested itself in whether airports made a profit. They are interested only in whether airlines make a profit. We don't see this; we don't like it; we think it's un-American; and it ain't gonna' work.

We run a fair size little business and we definitely would not limit our customers to those people living in cities of 100,000 or more. There is no difference in the value of U. S. currency coming from small towns as compared to that coming from the larger cities. Neither is there any difference in the right of the individuals living in small towns to have the service that might be afforded by feeder airlines.

We have lived through a considerable number of fights between railroads and bus lines, railroads and airlines, airlines and bus lines, and so on. We think that only the American people lost. There are all modes of transportation and they are useful for various kinds of freight commodities and travel, depending upon the urgency and the necessity for economy. Surprisingly enough, an awful lot of freight is still hauled by water, which is slow but cheap. Waterways are even being developed at the present time purely for the purpose of hauling heavy freight cheaply. Nevertheless, there is a great deal of urgent freight and express than can't wait, and by being forced to wait, adds an expense to every American life, expenses caused by waiting profit no one. All wealth consists simply of man-hours expended effectively and when man-hours are not expended effectively but are utilized only in waiting, potential wealth is lost.

We think a good deal of commut-

THE BLACK WIDOW

In cold, catalog language, the Northrop P-61 is "an airplane designed for the interception and destruction of hostile aircraft in flight during periods of darkness or poor visibility."

But to many a high-flying Heinie and Jap, this twin-tailed beauty with the kiss of death is an unseen nightmare. Her sleek blackness blends with the night . . . her sensitive "feelers" seek out the enemy with deadly accuracy . . . suddenly, she closes in, spitting hell from 20 mm. cannon and .50 cal. machine guns.

She's a tough lady, this Black Widow — largest, most powerful fighter ever built. And she's more than proved her mettle in darkened skies over every battlefront.

We at Chandler-Evans feel a kinship with this plane . . . because our fuel pumps are among those chosen for use with her huge Pratt & Whitney 2000 h.p. engines. And it is the superb performance of planes like this that make every Chandler-Evans man and woman determined to keep on producing the finest fuel pumps possible — *and in quantity.*

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ing by air would be done if air transport was available. In the North and East, we have seen people commuting regularly from fifty to one hundred miles twice a day. We know personally a number of people who travel an hour, or an hour and fifteen or twenty minutes each morning and each evening going to work. They do that because living accommodations are not available near the place they work but it might be done for other reasons too. It might well be that people would like to live in Bristow or Okmulgee and commute to Tulsa daily. These trips by bus require an hour and a half. We know that the people of the smaller towns are robbed of the possibilities of having fresh fish, flowers and other things that they might wish and that business is irrevocably lost simply because there are no airline connections there.

Airplanes Are Available

There are a good many aircraft presently available in the United States and thousands of pilots capable of flying feeder airline routes. These aircraft range from inexpensive ones to ships that would accommodate a good many people and many pounds of express and mail.

We have faith in the American businessman—he is not going to start without a fair knowledge of what he is up against. We have looked over some of the briefs that have been filed and have seen some of the figures on the potential business. It has been found by actual practice that in proportion to the population, some of the smaller cities originate more people than the larger cities do. One feeder airline group already operating a couple of short hops believe they will originate 6.66 passengers per mile per year on a system-wide basis. This means that if they had some hundred miles of routes they would carry 666 passengers in a year. That means that a transcontinental airline, to do as well, would have to originate almost 20,000 passengers going from one side of the country to another to equal that number per year. It's doggonned doubtful that they can do it. Thus, it seems that at least on certain feeder routes, ample traffic would be obtained to pay all the cost and provide a fair profit, which could be used in obtaining better equipment and facilities and improving the service.

The airlines and the larger cities would be the recipients of the greater part of the value of such traffic. It takes six hours on a bus for people living half way between Tulsa and Dallas to reach either city. The connections are uncomfortable and so they usually don't go. Many of these smaller cities have direct rail contact with other places than their nearest large cities, so they go to those points and transact their business rather than to go to closer but harder to reach places. It has been found that many citizens of the smaller and more remote towns make one or more trips per year to points 500 to 1,000 miles distant. Those are definitely airline trips and with the great interest and the extreme number of new converts to aviation obtained during this war, those people most certainly would go by air if the services were available.

Airmen's Calendar

June 5—Institute of Aeronautical Sciences meeting, Washington section.

June 7-9—Aviation Writers Association annual convention, Chicago.

July 30—International Air Transport Association, executive committee meeting, Paris.

September 2—Interhemisphere conference on frequency allocations and revisions, Rio de Janeiro.

October 16—First meeting, IATA, Montreal.

October 31-November 3—1945 National Aviation Clinic, Oklahoma City.

Private Flying Would Benefit

The feeder airline business is interesting to me primarily because of its importance to private aviation. I know some feeder airline companies that intend to construct some airports of their own if municipal fields aren't available, so they can serve those municipalities. My main kick about aviation for a goodly number of years has been that there were not enough airports to transact business universally by air, nor were there enough airports to provide sufficient safety in event of bad weather or forced landing from mechanical trouble. Thus, for each airport created by feeder airlines or sustained by feeder airlines there is another landing facility and in all probability additional mechanical service available. This greatly improves aviation in general. We think this is so important that every citizen, whether he is interested in feeder airlines per se or not, should immediately write his Congressman, the CAB, and the airlines demanding that feeder airlines be not only permitted but encouraged, in every way possible.

Whenever there is an airport at every city and town, flying courses and facilities for the average man and widely-distributed mechanical service, and whenever all the people are given day-after-day exhibitions that flying is safe and reliable, then we may expect the full development of air transport. There will be cheaper and better private airplanes because there will be more and more people who believe in flying and who will be flying them.

We think it is un-American to oppose feeder airlines. The chances are that anyone who does oppose them is short-sighted and selfish. ★ ★ ★

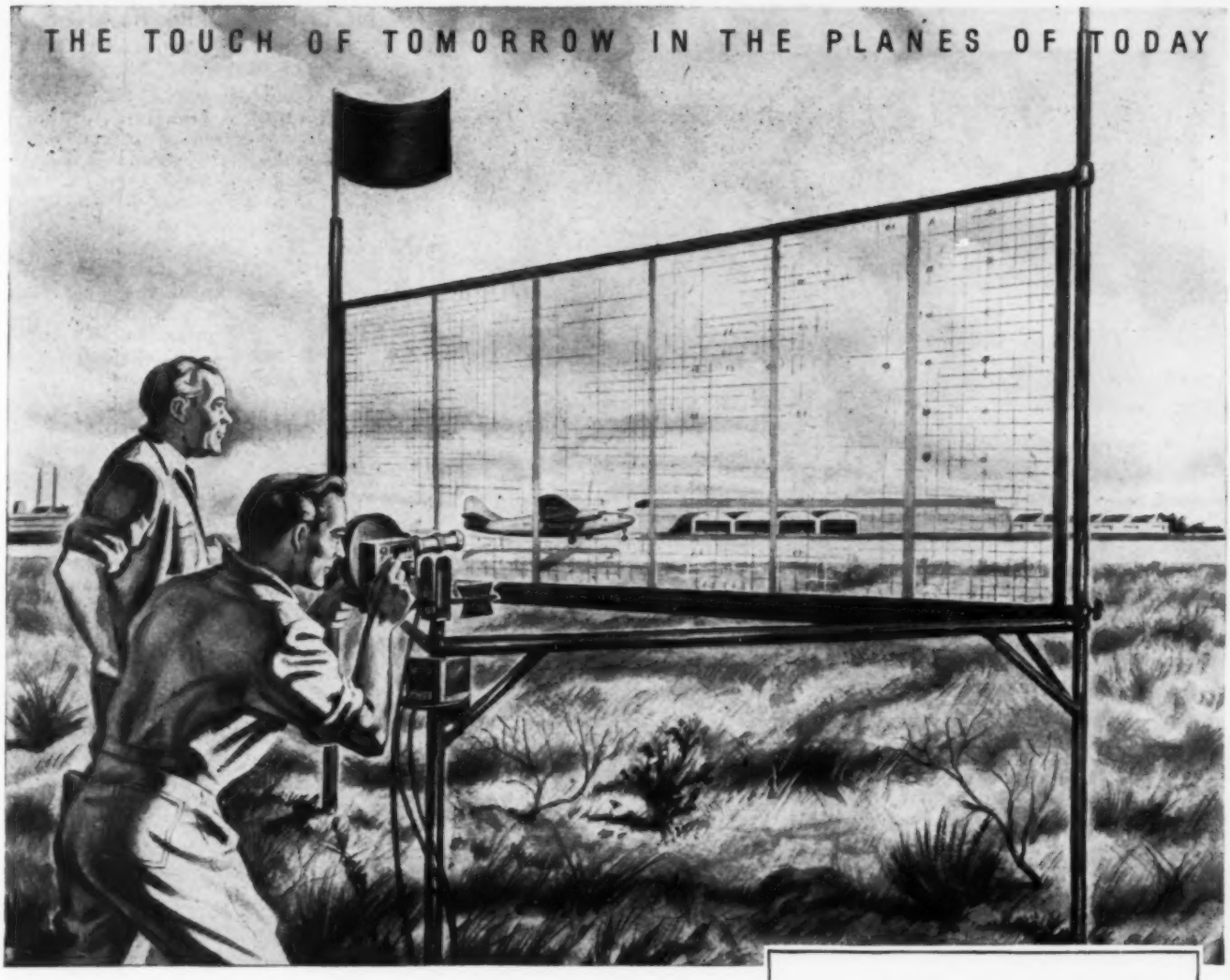
Makers of Precision small parts for the Aviation Industry

★ ABILITY ★ PRECISION ★ PRODUCTION

DOLAN AIRCRAFT MANUFACTURING COMPANY

DALLAS, TEXAS

THE TOUCH OF TOMORROW IN THE PLANES OF TODAY



SCREEN TESTS FOR A NEW STAR

Across the "screen" flashes an airplane powered by the latest model Ranger engine.

Its progress is recorded on film.

Does its performance surpass expectations? What's the exact rate of climb from the take-off? Is the propeller and engine combination correct?

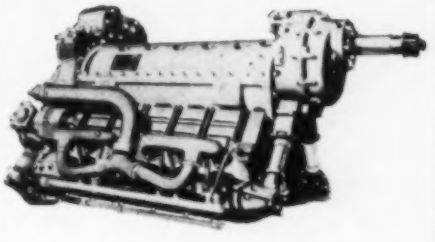
Study of the screen test films will show.

Through this and other carefully controlled scientific testing, Fairchild engineers are proving the efficiency, versatility and endurance of Ranger engines.

Constantly improved since its inception, the Ranger engine today packs more power into an even more efficient package. Fairchild research and engineering skill have developed a flying power plant that is "inline for the airlines."

The emphasis is on efficient horsepower production; length of service between overhauls; ease of maintenance; and economy.

Today, flying over test fields in ships that are basic designs for the airplanes of tomorrow, Ranger models, like all products of Fairchild research and experience, provide a "touch of tomorrow in the planes of today."



THE RANGER TWELVE

Skillful engineering has built these qualities into Ranger engines:

- High speed for ~~smooth~~ power
- Inverted for a wider field of vision
- Inline for minimum drag and maximum flexibility
- Aircooled Al-Fin cylinders for greater power
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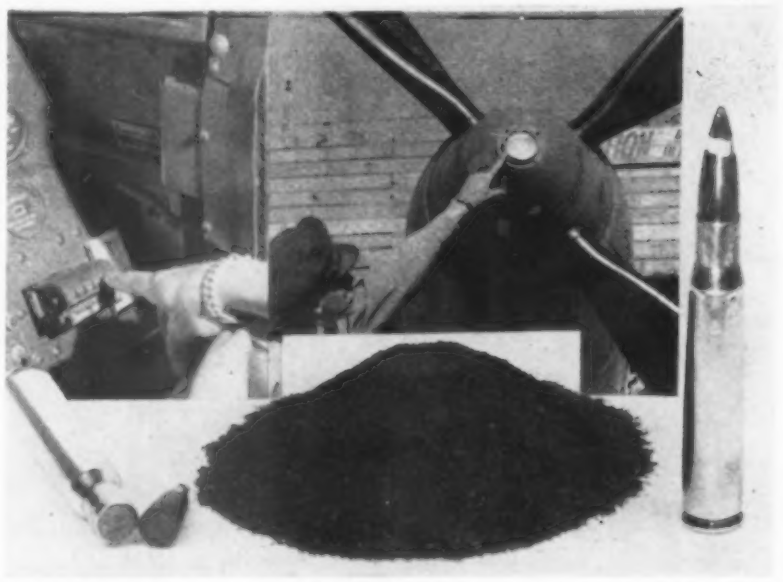

FRANGIBLE BULLETS FOR GUNNERY TRAINING are composed of lead and plastic material which disintegrates into harmless powder on impact (foreground photo shows resultant powder). Target planes are armor-clad P-63 fighters. Upper left shows target plane's meter which tallies hits on P-63, and light on propeller hub blinks when craft is hit, enabling gunners to tell instantly from flashes whether their aim is accurate.

—(AAF Training Command Photos.)

HITS WITHOUT HURTS

AAF flexible gunnery students are shooting bullets that disintegrate on impact against attacking target planes flown by human pilots.

Frangible bullets, .30 caliber machine gun slugs, are used in the students' guns for actual gunnery practice while in the air. The bullet is made from a combination lead and plastic material which splatters harmlessly into fine powder on striking specially treated duraluminum. Developed by the AAF Training Command, it was first used at the Command's central school for flexible gunnery at Laredo, Texas, and is to be used at five other AAFTC schools.

Nearly every condition of combat is duplicated, with the exceptions of anti-aircraft and return fire from the attacking fighter plane.

Orange-painted P-63 Kingcobras are used as target planes in the air-to-air firing missions. Air Technical Service Command officers overcame many obstacles to modify the P-63 for use as the target plane. They had to make sure that the pilot would be perfectly safe from any angle. They arranged for him to be surrounded by armor plate and one-inch bullet-resisting glass. Bell Aircraft Company engineers installed heavy plate around vital parts of the engine and gas tank and designed special grills to protect the air intakes and exhaust outlets. The propeller had to be especially thick-skinned to withstand the bullets.

The target plane is equipped with a radiosonic device which automatically registers hits on a counting meter located in the cockpit of the plane, and flashes a lamp mounted in the plane's nose when the frangible slugs hit the airplane. If the gunner's aim is bad, the instructor who rides in the bomber with him can correct it at once.

Heretofore, on air-to-air firing missions, student gunners either fired live ammunition at cloth targets trailed by other airplanes or "shot" movies of attacking planes with gun cameras. After returning from the missions they would check their hits by counting the holes in the cloth target or by viewing the gun camera film through special assessing devices. They couldn't tell, however, whether their hits were wild shots or were made while they were aiming correctly. The frangible bullet set-up, together with the radiosonic devices, enables the student to tell immediately whether he is aiming correctly.

In addition to the Laredo school, sham combat air practice with frangible bullets will be conducted as part of the standard curriculum at gunnery schools at Buckingham Army Air Field, Ft. Myers, Fla.; Tyndall Field, Panama City, Fla.; Harlingen Army Air Field, Texas; Yuma and Kingman Army Air Fields, Ariz., and Las Vegas Army Air Field, Nevada.

NON-STALLING PLANES

(Continued from page 40)

All two-control airplanes should incorporate independent aileron control systems. This is necessary in order to afford a degree of safety comparable to that of conventional three-control airplanes where either the aileron or rudder system ceases to function. The true two-control airplane does not have inherent spiral stability and also the directional control is dependent upon the airplane's ability to bank. Consequently, complete loss of aileron control in a two-control airplane leads to an uncontrolled spiral.

Rate of Climb

The second approach to the spin-stall problem is through providing an adequate rate of climb. The present Civil Air Regulations require a first-minute climb equal to eight times the power-off stalling speed but not less than three hundred feet per minute for landplanes, and six times the measured power-off stalling speed but not less than two hundred and fifty feet per minute for seaplanes. It is proposed here and has already been proposed to the Civil Aeronautics Board that both requirements be changed as follows:

> "The steady rate of climb at sea level with not more than maximum except take-off power shall not be less in feet per minute than ten times the measured power-off stalling speed with flaps and landing gear retracted or 500 feet per minute, whichever is greater."

The connection between stalling accidents and rate of climb may not be apparent at first glance although many have been convinced that during the take-off of airplanes with low rates of climb a very high level of skill is required in order to climb successfully without stalling the airplane.

Aside from the stall-spin phase of this item of our specification, it should be borne in mind that the required rates of climb are specified at sea level under standard conditions. The average altitude of airports throughout the United States is approximately 2,500 feet and the outside air temperature is known to reach values in excess of 100° at airports of almost any altitude. It is estimated that the typical light airplane at an altitude of 2,500 feet and a temperature of 100°F will have a rate of climb approximately 150 feet per minute less than the available rate at sea level standard conditions. This may be further reduced by turbulent air and slight decreases in power. This, we believe, also indicates the desirability of providing a greater rate of climb under standard conditions.

Although no attempt has been made to correlate the stall-spin accidents in multi-engine aircraft with rates of climb, it is desired also to give consideration at this point to the climb

ANOTHER MARTIN FIRST!

It's simple to dimple hard and brittle sheet metal with the Martin Spin Dimpler. Adaptable to any drill press capable of 15,000 R.P.M., the new tool may be used by semi-skilled or even unskilled workers.

Putting Dimples in Tough Faces

. . . with the new Martin Spin Dimpler!

NO problem, now, is the dimpling of hard and brittle sheet metals, such as Reynolds 301-T, Alcoa 75-ST and the magnesium alloys. Thanks to a new Martin tool . . . the Spin Dimpler . . . these metals are being dimpled as quickly and easily as softer alloys.

The Spin Dimpler has been used at the Glenn L. Martin Co. to form 100 degree dimples for 3/32, 1/8, 5/32 and 3/16 diameter rivets in both aluminum and magnesium alloys varying from .020 to .064 in thickness. In the case of aluminum, a lubricant . . . Tycol-655 . . . is used.

A product of Martin Engineering, the new tool forms dimples by spinning rather than by pressing them into shape. Trimmer cutting edges remove any metal which is extruded upward and a pressure pad assembly holds sheet in place during the process. Dimples feature a sharp edge, leaving no void around the rivet head, and resist corrosion as well as do machine counter-sunk holes. The Spin Dimpler is now being manufactured, under license, by Topflight Tool Co., Towson 4, Md., and Schaefer Machine Co., Inc., 100 White St., Brooklyn 6, N. Y.

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GLENN L. MARTIN-NEBRASKA COMPANY—OMAHA

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Wait a Minute, Mister!

Before you turn the page, think! Our fighting men are 100% in this war—and we're only putting 10% of our incomes into War Bonds! Isn't it time you bought an *extra* War Bond? Keep faith with your fighters and yourself . . . buy War Bonds for keeps!

performance of multi-engine aircraft. In this connection, the following is proposed:

> The steady rate of climb, with the critical engine inoperative, the propeller stopped, all other engines operating at the maximum except take-off power available, at the altitude, the landing gear retracted and the flaps in most favorable position, shall be not less than 100 feet per minute at standard altitude of 5,000 feet.

It is realized that there are airplanes operating which will not meet this requirement and that there has been very little concern over the problem until recent date. This concern has been primarily prompted by the fact that it has been necessary to certificate some large and heavy airplanes which were incapable of climbing with one engine inoperative at sea level which is permissible under existing regulations. It is believed that airplanes such as these are potentially more dangerous than a single engine with the same wing and power loading for the reason that the probability of engine failure is at least twice as great and, in the event of its occurrence, a serious control problem is introduced which is not present in single-engine airplanes.

Free-Control Stability

The next item concerns the ease of handling of the aircraft in the air and its ability to fly with a minimum of attention from the pilot. In this regard it is felt that the airplane should be statically and dynamically stable throughout the speed range of the aircraft, both with controls fixed or with controls free.

> The airplane when trimmed for steady cruising flight should not take up a dangerous attitude or speed when all controls are abandoned in average weather conditions for a period of three minutes.

It is believed that this is a necessary condition for operation of a private airplane under conditions of restricted visibility. It is possible, however, that this requirement could be modified in the case where an approved automatic pilot installation is made a part of the aircraft. In other words, the airplane should be sufficiently stable so as not to require an excessive degree of diligence on the part of the pilot at times when it will be necessary to divert his attention elsewhere.

The airplane should have a stable landing gear with no trick landing or taxiing characteristics. It should be easily controllable on the ground and equipped with brakes which produce no dangerous tendency to nose over in any operation condition reasonably expected. All landplanes should be satisfactorily controllable with no exceptional degree of skill or alertness on the part of the pilot in normal landings during which brakes or engine power are not used to maintain a straight path.

The next item concerns propeller protection. This has not been too great a source of difficulty up to this time, although it is anticipated that a wide use of the airplane will result in a large number of accidents, particularly in the family type airplane, unless some provision is made to protect the unwary and especially children from contact with a rotating propeller. It is believed that this protection should be required even to the extent of installing a ring around the propeller which would, if anything, increase the efficiency of the propeller unit. Probably the best approach to this solution thus far has been the twin-boomed pusher arrangement.

Maintenance

Ease of maintenance is the next important item which is very often overlooked or not given sufficient emphasis in the private airplane where first cost is also an important factor. The fact that ease of maintenance must be emphasized in the design stage is clearly brought out in the study of structural failures and defects reports in Safety Regulation Release No. 33 which states as follows:

> "Though the relatively large number of inadequate maintenance cases may, on the first thought, be considered excusable insofar as the airplane design is concerned, the analysis indicates that improvements in design from a maintenance standpoint by making aircraft components less susceptible to malfunctioning from lack of proper care would materially reduce the number of difficulties and thus effectively increase the safety of flying. It should be borne in mind that points most frequently in need of inspection on an airplane are control cables at pulleys and fairleads, control linkages, and all moving parts and locations where wear is likely to occur and where lubrication is required. Satisfactory maintenance of these elements can only be carried out if the number, size, and location of inspection openings are such as to give adequate accessibility."

In line with keeping the operations problems of the private flier to a bare minimum, it appears essential that something be done to solve the weight and balance problem. At the present time, it is not an important factor in the average two-place aircraft. However, when consideration is given to the four- or five-place airplane, which will probably be the family airplane of the future, it is considered essential that the aircraft be designed for full gas and oil, all seats occupied by 170-pound passengers, and all baggage compartments full without exceeding the allowable gross weight or center of gravity limits. The gas and oil supply should be sufficient for a minimum of three hours or four hundred miles cruising.

It is a well-known fact that accelerations in suddenly pulling out of a dive are greater than those of any maneuvers started at the same speed. It would therefore appear that some further restriction or means of limiting the maneuvering load factor imposed on the aircraft should be provided. In this regard, it is proposed that the airplane be designed to have a stick force per g of not less than ten pounds at 1 g, increasing in a manner to give a minimum stick force of 45 pounds at a load factor of 3.

Other Considerations

Finally, it is proposed that an airplane embodying all of the above characteristics should carry a permanent, prominently displayed operating instruction which would prohibit all acrobatic maneuvers including intentional spins and list the "never exceed" speeds, flaps up and flaps down, a rough air speed corresponding to a 45-foot per second gust, and the best rate of climb speed, these items being of fundamental importance to the safe operation of the aircraft. It is believed that an airplane which incorporates all the aforementioned features and carries the above placard could safely be operated if designed to a limit maneuvering load factor of 3.5 and an ultimate load factor of 5.25.

It must be emphasized that **only** in an aircraft possessing **all** the design characteristics just discussed can this reduction of the maneuvering load factor to this level be justified. The gust load factor would still be determined by the conventional 30-foot per second gust at a value not less than .9 of the maximum level flight speed and the 15-foot per second gust at the design dive speed.

There are a number of other items which should naturally be considered such as comfortable and roomy cabins with emphasis on cleanliness, water tightness, ease of entrance and exit, low noise level both inside and outside the cabin, slow landing speeds, additional cruising range, radio equipment, adequate lights for night operation, ability to utilize small landing strips in or near residential centers, and reliability and safety in operation under near instrument conditions which, although desirable, will probably have to be placed in the class of recommended design features.

In conclusion, it is believed that all the conditions in the items mentioned above are not only possible of realization but an eventual "must". They are offered in the spirit of a challenge to the industry to build **now** the safe type of airplane affording a maximum of utility combined with ease of operation and maintenance that the general flying public is going to demand before we can hope that private aircraft ownership will achieve the widespread popularity for which we are all striving. ★ ★ ★

Mr. Maloy's article was adapted from a paper he delivered before the Detroit Section of the Society of Automotive Engineers.

THE TEST PILOT'S PASSENGER

BY PHILLIP ANDREWS

Editor and Publisher of "Air News" and "Air Tech" tells how delicate flight research instruments run aircraft "behavior tests" while the pilot flies.

Test pilot Chalmers H. Goodlin and Engineer Stuart K. Edleson talk over a motion picture record of a test flight.

"ONE of the keenest scientific combinations of mechanical brains and eyes is the flight instrumentation equipment designed and built by Bell Aircraft's Flight Research Division. It is the kind of equipment which will assure safer flying for you in the peacetime aviation days to come.

"The test pilot of a high-performance fighter, like the Kingcobra, has no room for extra passengers, nor has he time to record scores of instrument readings himself. But the readings *must* be made—from all parts of the plane—and they must be complete and right.

"So Bell engineers developed their own equipment, smaller than available commercial instruments and capable of installation in half the time.

"From take-off to landing, while the pilot concentrates on putting the plane through her paces—loops, climbs, high-speed runs, breath-taking power dives—these delicate instruments are always at work, recording complicated data on stress, strain, pressure, temperature and all the other things the engineers want to know.

"While all this happens, a movie camera is automatically making a continuous film record, like the one shown in the picture, of all the cockpit panel instruments.

"And when the flying is done, the record is still there, accurate and complete, available for the kind of thorough analysis and study that makes for faster production in the factory and dependable planes in combat.

"Bell Aircraft's emphasis on scientific research and creative engineering has played an important part in the tremendous forward strides of the aircraft industry since the start of the war. And when the day of victory comes, count on this progressive company to pioneer on peacetime aviation horizons."

★ *Buy War Bonds and Speed Victory* ★

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FLIGHT INSTRUCTOR

(Continued from page 39)

the process of a forced landing, but it can also happen when, through pride or ignorance, a pilot making a normal landing refuses to admit that he must gun the motor to make the field. He tries to lift the airplane up by the nose, loses speed and dives or spins into the ground. This is the reverse of the cases we have been talking about. Together they show that a stall can result from either too much or too little speed, and emphasize that the important thing is *control* of speed.

Only power can make an airplane go up, or reduce its rate of descent. But when you put this across to your students, remind them that when they pour on the coal, the nose will try to come up suddenly and they must push forward on the stick to control their speed until natural balance is restored —otherwise the nose may whip up into a stall.

I think that if you teach your students to expect a spin anytime, particularly in the simplest of maneuvers —and to feed top rudder and forward stick (reducing the angle of attack) instantly, they will become not only good pilots but old ones.

The cases are endless of pilots ending their careers in the simple act of circling a friend's house. Too many of these have been pilots who should have known better. In one year, about half of the fatalities in CPT program resulted from spinning out of figure eights, and *in every case the instructor was along!*

The factors I have mentioned—surprise, lack of speed control, and crossing controls— are aggravated by some form of vertigo or fatigue when a pilot concentrates his attention too long in one place. In discussing this with Cal Johnston, who has investigated many accidents with the CAA, and tested many planes and pilots, I learned that this can come from staring at instruments in blind flight, as well as at the home of the girl friend.

I have told you before that I make my students crane their necks and keep their eyes moving—from the left stabilizer, to the left wing tip, across the nose, to the right wing tip and the right stabilizer. The reasons I have given were to make them relax, to improve their control of the attitude of the plane, and to avoid collisions. This should be stressed even more when maneuvering in relation to something on the ground as in figure eights or in making a landing. I have seen two students do figure eights across each other's path who were horribly surprised when I told them about it later.

The best way to avoid a fatal finish to an air show over your girl's house is not to give such an exhibition in the first place. There are, however, legitimate occasions on which it is necessary to maneuver close to the ground, such as on a search, or spotting the wind tee on a strange field. The pilot who has acquired the habit of keeping his eyes moving, and remembers that looking at the ground is only part of what he has to do, will find it easier to keep out of trouble. If he remembers that what he is doing is more dangerous than it looks, that he may get into a spin anytime, and the way to prevent or recover from a spin is to reduce the angle of attack, he may tell his grandchildren about it.

Remember that teaching stalls and spins is really only a means to avoid them. ★ ★ ★

PRIVATE FLYING ROUNDUP

(Continued from page 31)

engine plane that is made—and this, with good soundproofing, makes cross-country trips a pleasure.

"With Hamilton Standard constant speed metal propellers, the UC-78 has low-altitude single-engine performance. However, we do not recommend its single-engine performance at higher altitudes. We feel we can safely fly cross-country over routes such as that between Fort Worth and Los Angeles, because with any altitude at all one engine can stretch its glide from one field to another. But we don't claim that the airplane will hold its altitude above 3,000 or 3,500 feet on one engine. It all depends on the load. But we do know we can hold as much as 3,500 feet for an hour because we have done it. We have also cut one engine on the take-off inside the fence—with a full gross load of 5,700 pounds (300 pounds over the gross for which it has been licensed) —and we made our turn very safely and much above the minimum flying limit and came back in for a landing. The UC-78 has excellent take-off characteristics and gets off as well at El Paso as it does in Fort Worth. The loading seems to make a little difference in take-off or climbing performance."

Bowman's experiences with buying surplus Cessnas and reconditioning them (he has one of the best shops in the country) has also resulted in developing much caution. "I visited five fields where Cessnas were in storage and looked over hundreds of them," he said. "I found that two of those fields had no airplanes worth buying at all. The other fields had anywhere from four to eleven airplanes that I would consider good buys. However, they're moving in more all the time."

Here's what he interprets as a "buy" among the Cessna's: "It would be a UC-78 that had been used for transportation of executives or Army personnel—not for training. It would have to be equipped with constant speed props. It would have to be painted in silver without any olive drab. It would have to carry a thirty-gallon auxiliary gas tank under the rear seat. And it would have to have less than 600 hours of total time." Bowman added that his personal investigation at various fields from Texas to California showed there are "just a few top-shape Cessnas" meeting the above requirements. Bowman's "don'ts" to prospective buyers include: "Don't buy one with wooden propellers; don't buy one in olive drab color; don't buy one that needs recovering, and don't buy one without the extra gas tank."

Many items enter into the condition of the surplus Cessnas. The factory has advised operators that it does not recommend purchase of UC-78's or AT-17's with 5,100-lb. wing assembly installed, due to the low allowable payload. Only the 5,700-lb. wing model is recommended for efficient commercial operation. Also, some of the surplus planes may have wings which were not modified with additional ribs in the leading edge, and the company does not recommend buying those with unmodified wings as the modification cannot be accomplished in the field. Cessna has also recommended that the airplane be operated only with constant speed propellers.

★ ★ ★

SINGLE-SEATER

(Continued from page 33)

The designers had the following to say about the airplane's construction: "The design was undertaken with the view of eliminating all fittings and joints subject to shock loads and reducing the number of points which require frequent inspection. In order to ease maintenance and inspection of the engine compartment, the engine cowl is made in four individual removable sections, each held on with fifteen extra large cowl fasteners."

M. E. Salvay, chief engineer on the project, said a free blown teardrop plexiglass cockpit enclosure has been developed for the airplane, although the prototype has not been equipped with it yet. A two-place model is on the boards, and a four-place design is being perfected, he added. G. A. Stark is president of the firm. Both Stark and Salvay formerly were with Rearwin. ★ ★ ★

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CHARTER OPERATORS

(Continued from page 32)

work would be after scheduled feeder service is in operation. This additional service will take a considerable portion of the non-scheduled charter business. As a result, the requirements of the non-scheduled operator may change. A survey of the problems can well be made at this time by both operators and the Board. Regulation in the form of certificates of public convenience and necessity should be delayed."

Safety Is Uppermost

Higher maintenance requirements are needed, an NATA member declared in a letter, but that is about all the operators need from the government. Here is his view: "I would like to see the type of equipment more or less specified, but frankly I think that will be a hard job, because a man has the right to charter any kind of equipment he desires. Also, I would like to see maintenance elevated to a standard much higher than that required today. For instance, a man went into business here several weeks ago. He bought a worn-out, fatigued SR-5 Stinson. The motor blew up thirty miles out of here on his first trip.

"In the first place, the plane was too old and outmoded and in too poor condition for charter work. Then the second thing, the pilot was not the kind of cross-country pilot he should be, even though he had been instructing for a number of years. Then the next thing is, he had taken the trip at such a cheap rate that we would not even touch it at the same price to continue the trip for him. The rate he was charging would not have paid our expense on our type of equipment and the way we maintain it."

One operator pointed out that the CAB should consider the effect of proposed feeder airline operations on charter and taxi flying. His letter stated: "The CAB should wait until they have completed the present scheduled hearings of feeder applicants and authorized service of the approved routes, and compile information regarding the effect of this service on charter operators. I would estimate that feeder airlines will take approximately 50 per cent of the present potentials of the charter operator."

And speaking of schedules, a veteran charter operator summed up his feelings about regulations as follows: "Firemen don't operate on schedule; charter service is like a taxicab — come where called and go where told."

Figures on Charter Flying

Timely information on the nature of charter work and its ramifications was obtained from answers to questions put to NATA members, eighty-five of whom returned answers. The following was compiled from these answers:

Eighty-five operators carried a total of 9,962 charter passengers from January 1, 1944, to January 1, 1945. Fifty-two per cent of the trips carried only a single passenger, and 65 per cent of all trips returned without passengers. Total mileage flown in charter operations was 2,229,704. A study of the figures indicated that 24 per cent of the trips were made fifty to 100 miles from base, 28 per cent from 100 to 200 miles, 19 per cent from 200 to 300 miles, 22 per cent from 300 to 500 and 7 per cent over 500 miles.

Twenty-two per cent of the requests for charter trips could not be made because of lack of airports at destination. A widespread system of airports would be expected to increase charter business 68 per cent. Needed facilities include town marking, off-line weather reporting and more weather stations in the mountains, more radio facilities with possible omni-directional facilities at many points, and more small airports.

One question asked in the questionnaire was stated as follows:

"Would you purchase a two-place, medium-priced, fast, fully-equipped ship for your single passenger business if available?" Fifty-seven per cent indicated they had enough business to purchase such a plane, provided it was fast enough.

Another question asked this: "How much more business could you do with a light four-five place, twin-engine ship which sold for about the same price as the present good single-engine ships if operational costs were about the same?" The answers indicated operators could do 80 per cent more business if they had a small twin-engine aircraft that could be cheaply operated.

Seventy-seven per cent of the operators said they did not feel single-engine equipment is safe for night charter operations.

Even with an exclusive territory and rates comparable to airline travel, 59 per cent of the operators do not believe charter business alone would pay a profit. Seventy-nine per cent feel airlines should not be allowed to set up special charter service for through passengers to off-terminal destinations.

★ ★ ★

LOCAL AIR SERVICE

(Continued from page 35)

tion for all airplanes including spares ranged from 1,800 hours to 2,800 hours annually, with the average mean approximating 2,260 hours per year. This latter figure was used in making computations. A formula was developed, based on 2,260 hours yearly utilization, to determine the total aircraft requirements for varying route mileage.

Aircraft requirements periods were established, upon which estimated numerical requirements were based. The interim period was considered as being that period when existing transport types would be used pending the development of new aircraft. For various reasons, including the effect of war conditions and the timing of board decisions, this period may not take place, but, assuming that it might it was estimated that 231 aircraft might be required. By secondary period was meant that period during which newly developed aircraft would replace interim aircraft in all short haul operations. In developing what may be termed estimated probable requirements for new aircraft during the secondary period, it was necessary to make certain assumptions as to the possible trip frequencies which might be attained during the period, the possible interim aircraft replacement schedules which might be expected, and the probable interval at which trip frequencies might be increased.

On the basis of the aircraft requirements formula, numerical estimates of probable aircraft requirements were developed for varying route mileage and trip frequencies from which it appeared that the potential maximum market for new aircraft during the secondary period lay between 282 and 1,125 units. Using trip frequency estimates, and on the basis of 27,972 route miles, more specific probable aircraft requirements were estimated. Although the exact figure determined was 538, it must be recognized that this figure was the result of the statistical computations, and is, therefore, a fictional figure. Market surveys are not expected to result in exact forecasts, but rather to compile known facts and from these facts develop reasonable conclusions as to a probable range of requirements. The Fairchild survey estimated this range of probable requirements during the secondary period of operations as lying between 500 and 600 new aircraft of the short haul type.

The requirements may vary, but the proper development of a nationwide local air network definitely promises important postwar advantages. ★ ★ ★

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AIR POWER
In Action

By TOM ASHLEY

AS the Germans stumbled into complete collapse at the end of April, Allied ground forces occupying Germany came to know the real meaning of strategic bombing. Confusion which had clouded its effectiveness gave way in the ruins of steel plants, oil refineries, armament centers, rail yards, aircraft factories and bridges. Captured German leaders such as Von Rundstedt, who had commanded the German defense of the Rhine, backed up the visual evidence with tributes to the deadly effectiveness of air power which had choked off the German army's resources and communications.

The Allied strategic bombing offensive had been slow in coming, but, when finally mounted with full force, it (1) achieved air superiority necessary for the Normandy invasion and maintained that superiority until the last, when the remainder of the Luftwaffe was destroyed on the ground, (2) slashed enemy production of engine fuel to the point that it was only 2 per cent of what it was in April, 1944, (3) defeated the V-weapon threat at its source by destroying both buzz-bomb and rocket bomb factory units and launching sites, and (4) joined tactical air forces to isolate the battlefields from German reinforcement and supplies.

A joint statement by the U. S. Strategic Air Forces in Europe and the British Air Ministry on April 30 said the strategic bomber offensive was "brought to full execution in the last fifteen months." That is by way of saying that the war in Europe, which passed its sixty-eighth month in April, had lasted fifty-three months before strategic air power reached maturity in the campaign against resources which Germany had developed for world conquest.

German Army Denuded of Air Cover

Long-range bombing scored its first major accomplishment during a six-day period in February, 1944, by wrecking German aircraft production facilities so completely that German fighter output was cut by 75 per cent. Not only did the enemy disperse his aircraft industry to some 300 small plants, many of them underground—he pulled in his fighter defenses to guard the homeland and to hoard his planes for the battle of Germany, leaving his ground forces denuded of air support. New information has been supplied by the AAF and the British illustrating Germany's shortage of fighters and showing how the German ground forces were deprived of air protection in order to guard Hitler's factories from Allied strategic bombers.

When Germany invaded Russia in the summer of 1941, the Luftwaffe consisted of approximately 6,000 first-line combat planes. About 3,300 of these, or 56 per cent, were assigned to air support for the German ground forces. But demands for protection at home against long-range Allied bombing forced a change in policy, and so many planes were recalled from the Russian campaign that by the end of 1943 only 350 planes, or 18 per cent of the German Air Force, were operating in support of the German Army on the 2,000-mile Russian front. After the strategic bomber offensive in the spring of 1944, Germany had denuded its anti-invasion forces in France, and when the Allies invaded Normandy on June 6 the Luftwaffe flew only seventy sorties.

But the clearest proof of Allied air superiority, as won by strategic bombing, was found in the absence of serious German air assaults against Allied ground troops which advanced across Western Europe to the Elbe and a juncture with the Russians. The final death blow to the German Air Force took place in March and April, 1945. Prior to the ground offensive which crossed the Rhine and encircled the Ruhr, all airfields in Northwest Germany and Holland were bombed and strafed to neutralize concentrations of hoarded air strength. Many of their planes, handicapped by fuel lack, were caught on the ground and destroyed. Scores were saved and flown to dispersal areas in north central and south central Germany, where they piled up wing tip to wing tip in the Berlin and Munich areas. There they were destroyed by bombing and strafing or captured by advancing ground forces. Two thousand of them were destroyed on the ground by the U. S. 8th Air Force alone in the eight days ending April 18.

Battlefields Isolated

Strategic bombing's isolation of German forces on the battlefield by destroying railroads and bridges is well known. Sometimes the heavy bombers, operating within yards of Allied troop positions, even held up German ground forces on the flank of a projected advance by Allied troops. This they did by churning up the whole countryside with deep craters to prevent movement. At other times they carpeted enemy forces with explosives fused to detonate without cratering the ground, thus paralyzing the enemy preparatory to Allied ground offensives. The effect of several thousand tons of bombs in a small area within half an hour or so was to leave the German troops stunned and incapable of serious resistance. Ger-

LOSSES IN THE AIR WAR
March 26-April 25
(Does Not Include Probables or Damaged Totals)

	Europe		Italy		Southwest Pacific		Russia*
	Enemy	Allied	Enemy	Allied	Enemy	Allied	Enemy
Mar. 26	....	....	5	12	....	2	37
Mar. 27	2	5	....	....	1	....	96
Mar. 28	....	2	....	....	....	....	23
Mar. 29	....	1	....	4	....	1	8
Mar. 30	49	35	1	2	....	....	25
Mar. 31	32	51	35	16	10	1	26
Apr. 1	51	31	12	15	8	....	40
Apr. 2	....	3	19	16	18	1	34
Apr. 3	1	3	1	9	4	....	29
Apr. 4	65	29	5	....	1	....	15
Apr. 5	75	16	20	9	3	4	39
Apr. 6	....	....	....	4	3	1	....
Apr. 7	223	39	....	1	....	1	88
Apr. 8	104	40	9	12	....	....	67
Apr. 9	195	27	....	5	....	2	28
Apr. 10	396	55	6	9	2	....	16
Apr. 11	153	25	2	15	3	1	22
Apr. 12	....	....	....	16	....	....	37
Apr. 13	321	16	....	14	....	....	40
Apr. 14	4	4	1	4	....	....	118
Apr. 15	26	7	2	20	....	....	80
Apr. 16	872	48	5	11	....	....	50
Apr. 17	282	24	4	10	16	....	10
Apr. 18	5	9	1	13	7	2	115
Apr. 19	42	27	6	13	....	....	140
Apr. 20	7	1	....	20	....	....	103
Apr. 21	14	14	....	9	1	....	56
Apr. 22	....	3	....	30	....	....	61
Apr. 23	6	9	....	24	....	....	60
Apr. 24	10	14	....	10	1	....	99
Apr. 25	12	33	5	29	....	....	82
TOTALS	2947	571	139	352	78	16	1644
Totals since Jan. 1	4975	2440	334	1172	1248	84	4973

*RUSSIA: Does not reveal own losses.
CHINA: 138 enemy planes destroyed at loss of 60. Totals since Jan. 1, 629 enemy, 149 Allied.
PACIFIC: 2,232 enemy planes destroyed at loss of 39. Totals since Jan. 1, 4,239 enemy, 215 Allied.
SOUTHEAST ASIA: 30 enemy planes destroyed at loss of 30. Totals since Jan. 1, 138 enemy, 118 Allied.
(NOTE: These figures are compiled by SOUTHERN FLIGHT from daily headquarters communiques issued by the respective commands. They are, therefore, subject to periodic adjustment. Dates for Southwest Pacific are those on which figures are released; others when action occurred.)

LOSSES IN THE AIR WAR FOR 1944 — EUROPE: 9,907 enemy, 8,467 Allied; ITALY: 4,048 enemy, 3,631 Allied; SOUTHWEST PACIFIC: 3,612 enemy, 420 Allied; CHINA: 1,037 enemy, 262 Allied; SOUTHEAST ASIA: 406 enemy, 253 Allied; PACIFIC: 5,279 enemy, 445 Allied; RUSSIA: 13,989 enemy

THERE'S A *New* FEATHER IN WACO'S CAP

Now rolling from the production line and winging its way off to war is the newest addition to the ranks of the "whisper" ships.

It's the CG-15A . . . a bright new feather in the cap of its designer and builder—WACO.

Similar in many respects to the WACO-designed CG-4A, this newest AAF glider incorporates several new features which are the outgrowth of the battle experience gained by the CG-4A in spearheading four major invasions. Wingspread has been shortened 20 feet to increase towing speed . . . a new nose section provides better vision and greater strength . . . passenger and cargo capacity has been increased . . . landing gear improved.

In the three military gliders previously designed by WACO for the AAF . . . and here again in the CG-15A, is evidence of the important contribution which WACO's long experience in plane design and construction is making toward Victory.

After Victory, when this same experience is again applied to peace-time plane production, the result will be something you'll want to see . . . something you'll want to own and fly. THE WACO AIRCRAFT COMPANY, 95 Peters Avenue, Troy, Ohio, U. S. A.

The CG-4A has a wingspread of 83' 8"; carries a two-man crew and 13 men; and has a useful load capacity of 3,427 pounds. The CG-15A (foreground, above) has a wingspread of only 62' 2½", but it carries 14 men, in addition to pilot and co-pilot, and can accommodate a useful load of 4,000 pounds.

Waco

WACO AIRPLANES

ALL ARMY CARGO-TRANSPORT GLIDERS ARE WACO DESIGNED

The WORLD'S WINGS

By LUCIEN ZACHAROFF

Japan's Synthetic Fuels

JAPAN can manufacture substitutes for aircraft fuel if she is separated from the natural resources of East Indies, it was recently claimed by Lt. Gen. Reikichi Tada, director-general of the Japanese Scientific Mobilization Association. He added that his country was capable of producing gasoline from coal, buthanol and alcohol from potatoes, and fuel and lubricating oil from pine roots. He did not say how they will procure coal and potatoes for the purpose.

★ ★ ★

100 New Russian Air Routes

European radio stations these days are reporting with increasing frequency aeronautical revival among the United Nations and neutrals. Thus, Radio Moscow has told of more than 100 air routes opened by the Northern Directorate of the Civil Air Fleet. The main line, of course, is the one connecting Leningrad with Moscow. Leningrad is also linked with such centers as Vologda, Arkhangelsk, Murmansk, Kalinin, Novgorod, Velikiye Luki, and Kolym. It also has services to Petrozavodsk, Stalino, and Riga.

Madrid Radio tells of air transport on the routes Palma-Barcelona-Palma and Palma-Valencia-Palma being resumed. In the meantime, closer liaison is developing between Spain and Portugal. A mission headed by the Portuguese Director of Civil Aviation, Lt. Col. Delgado, has been holding conversations with the Spanish authorities. A military air mission from Portugal has been reported in Madrid in connection with a possible establishment of a new aerial link between that city and Lisbon.

Two or three services a week are planned when the war is over by the Sabena airline between Brussels and Leopolodville, Belgian Congo, it has been announced by M. Orta, director-general. The 24-seat aircraft ordered in the United States are to cover the distance between Belgium and the Congo in 24 hours, with three intermediate stops. In the meantime, this run is scheduled on a bi-monthly basis.

The liberated Poland's first airline is swinging into action between Warsaw and Cracow via Lodz and Lublin.

★ ★ ★

International Roundup

Neutral Sweden's plans seem to be drifting into military channels. Her radio informs us that the **Flygvapnet** or air force is acquiring some 50 modern American fighters at an approximate cost of $12,300,000, exclusive of shipping. The Second and Third Divisions of the Swedish Air Force sent their fighters, light bombers, and reconnaissance planes to the province of Upper Norrland for exercises designed to promote co-operation among the different branches.

Twin-engined Beechcrafts are now in scheduled service of TACA de Venezuela. The company has a large interest in Aerovias do Brasil which is opening a new 967-mile route, bringing its Brazilian network total to 6,117 miles. . . . Used by the Germans during the occupation, Potez 63-IIs have been overhauled for use by the French Air Force units assigned to the Atlantic coast. . . . French wireless quotes Air Minister Charles Tillon's speech at Cannes promising production of 2,000 aircraft this year in French factories.

Three Russian airwomen have been designated posthumously Heroes of the Soviet Union; they died on a bombing mission against Nazi objectives. Another, the 22-year-old Natalia Metlin, flew 814 missions as of last February.

British fighters in Burma enjoy meat three times a week, thanks to a refrigerated aircraft operating out of Calcutta where a cold storage depot ships by air 300 tons of meat weekly. Bombay and Madras are expected to have similar installations soon, making possible a regular meat diet for every British serviceman in India and Burma. . . . A license has been issued in Portugal for an air taxi service. As filed with the Civil Aviation Secretariat, the plan calls for the carriage of passengers and freight within Portugal and abroad.

man prisoners were still dazed many hours later, many being temporarily deafened even after 24 hours. Perhaps the most important of all the bomber operations in the final battles for Germany was the isolation of the Ruhr. Here strategic bombing drained the main connection by water between the Ruhr and central Germany, destroyed sixteen out of eighteen railway viaducts and bridges, blocked twenty out of twenty-five railway marshalling yards and destroyed main industrial and railway centers in the Ruhr itself, already largely destroyed in 1943 and 1944.

German tanks, trucks and staff cars were disastrously crippled by strategic bombing's successes against enemy oil resources. Before the bomber offensive against German oil began in April, 1944, the enemy's normal output totalled 1,344,000 tons of all oil products and 532,000 tons of motor and aviation fuel. By September of 1944 the output of all oil products was down to 310,000 tons, 23 per cent of the original tonnage, and motor and aviation fuel production had been cut to 105,000 tons, 20 per cent of the original figure. In mid-April, 1945, the output of all oil products had dropped to only 7 per cent of the original, and motor and aviation fuel production had dwindled to only 2 per cent of the original.

Europe's Lesson

These are but a few of the facts clarifying the role of strategic bombing against Germany. Many more will be forthcoming as official boards representing both air and ground forces evaluate the war in Europe during the months to come. Such evidence is not intended here to belittle the effectiveness of tactical air operations. Medium bombers, fighters, strafers and dive bombers performed great accomplishments of their own by interdicting battlefields and destroying enemy personnel and materiel on the ground.

But it is important to view strategic bombing in the proper perspective. The war in Europe proved beyond any doubt that long-range bombardment not only paved the way for the Allied invasion of the Continent, but effectively destroyed major German resources at a time when ground action in Europe was impossible. If strategic bombing had not reduced German air strength by the means already outlined, the performance of tactical air force would have been different. It is one thing for dive bombers and strafers to operate without strong air opposition, as they did in France and Germany, and quite another to strafe and dive-bomb enemy columns and strong points defended by determined air cover.

If the lesson has not been plain enough in Europe, clear-cut evaluation will be supplied in the strategic bombing of Japan. Experimented with in Europe, long-range bombing is coming into its own in the Pacific ★ ★ ★

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Midwest Factories Produced Fifth of All AAF Planes, Half of Transports and All Trainers During March

One-fifth of the entire national monthly output of military aircraft, 1,425 planes, were produced in the Midwest during March, according to the Air Technical Service Command. Representing both Army and Navy aircraft production, nearly all of the planes were produced in the states of Texas, Oklahoma, Nebraska, Missouri and Kansas.

"It is extremely heartening to realize that 20 per cent of American aircraft production during the month comes from five states that together include less than 12 per cent of the nation's population," Brig. Gen. Ray G. Harris, District ATSC Chief, said. "It is testimony to the energy, ingenuity and patriotism of the people of the Middle West that they are so magnificently contributing to the war effort of their country. It is also proof of the spectacular accomplishment of Midwestern industry."

"As well as a good fraction of combat airplanes, facilities within the Midwestern District produced almost half of the transports and all of the training and special purpose airplanes accepted during March," he said.

6,412 Planes Built by Industry in April

Aircraft production during April totalled 6,412 planes, 9 per cent less than March output in units but only 7 per cent less in airframe weight, 73.6 million pounds being the April total. This was a record of 256 airplanes built per working day and represented a gain of 1 per cent over scheduled production.

Heavy Cuts in Future Aircraft Schedules Seen After European Victory

Prospects of victory in Europe early in May were expected to result in revisions in future aircraft production schedules, which might be reduced as much as 2,000 planes per month for the one-front war against Japan. Previously announced plans to effect a 15 per cent cutback in airframe weight output were expected to be changed considerably, but an Army Air Forces announcement said production will be tapered off gradually and in no case cut off immediately.

Cutbacks already announced included complete stoppage of B-24 output by July at Ford's Willow Run plant, and production of P-38's at Lockheed has been reduced 40 per cent and will come to a halt in November instead of December as previously announced, with Lockheed concentrating on the new P-80 jet fighter. Monthly output of B-17's at Douglas in Long Beach is being reduced by one-third and Lockheed's B-17 production is being slashed by one-half. "Newer models" of Thunderbolts and Mustangs and jet-propelled types replace older P-38's, P-47's and P-51's now in production.

Heavy models such as B-29's, B-32's, A-26's, P-80's, C-82's and C-54's will continue in full production and in some cases at increased quantities, but long-range planning for the Pacific war is expected to reduce all schedules during the year.

Boeing Advances Plan for Postwar Military Design, Production

C. L. Egtvedt, chairman of the Boeing Airplane Company, has outlined the firm's conception of a postwar military aircraft program which would insure that the development of future designs will always be going on concurrently with the production of latest designs, and would provide a basic backlog of work to insure the maintenance of engineering and manufacturing organizations that have proved invaluable to the nation's security in time of emergency.

The Boeing plan recommends that the government at all times should have contracts with aircraft manufacturers of demonstrated design ability for the following:

1. A minimum of at least two preliminary design studies for each type of aircraft, including research required in connection with such studies.

2. Construction of one or more experimental models of each type of aircraft selected as a result of previous preliminary design studies.

3. Production of the latest model aircraft of each type in quantities sufficient to develop production techniques, to permit complete proving through group maneuvers under all service conditions, and to give the United States air superiority.

N. Y. Firm Acquires Majority Holdings of Jacobs Engine Company

Majority holdings in the Jacobs Aircraft Engine Company, Pottstown, Pa., have been sold to the Continental Engineering and Management Corp., of New York, which has no connection with Continental Motors, Inc. The move was made to widen the Jacobs financial and manufacturing scope for postwar aviation developments.

No changes of name, policy, management or employes are contemplated.

Later, Malcolm S. Clark was elected as chairman of the Jacobs board of directors. Other officers are J. A. Harris 3rd, president; Paul O. Buckley, vice president; H. B. Knerr, vice president and treasurer; J. Story Smith, vice president and secretary; Albert R. Jacobs, vice president; A. W. Porter, assistant treasurer; Robert C. Hardy, assistant secretary and assistant treasurer, and Kenneth N. Thompson, assistant secretary.

Bendix Spurs Work on Personal Plane Radio

Bendix Radio division of Bendix Aviation Corporation has established a separate engineering and sales organization to co-ordinate development, manufacture and marketing of a complete line of efficient, low cost radio communications and navigation equipment for personal airplanes. George Myrick, former administrative consultant to the Civil Aeronautics Authority, has been appointed manager of Bendix Radio division's personal aviation sales. Charles F. Luscombe, former foreign and domestic service representative of the division, has been named sales manager for personal plane radio.

Columbus Plant Cited

Management and employes of the Columbus, Ohio, plant of the Curtiss-Wright Corporation's Airplane division have been complimented by Rear Admiral DeWitt C. Ramsey, USN, chief of the Bureau of Aeronautics, for having completed eighteen months of on-schedule production. The plant, producing Curtiss Helldiver bombers for the United States Navy, maintained its pre-determined production schedules in face of a change-over to a new model of the Wright Cyclone-powered Helldiver. As a result of planning and retooling, the switching from one model to another took place with an uninterrupted production record.

Globe Aircraft Rebuilding Douglas Transports at Ft. Worth for Delivery to U. S. and Foreign Carriers

Globe Aircraft Corporation at Fort Worth, Texas, has been selected by Douglas Aircraft Company as one of four long-established and prominent firms of top technical standing to enter into their novel system of "authorized conversion and overhaul centers" throughout the United States and Canada, according to J. S. Farra, Douglas Service Manager.

Under the agreement with Douglas Aircraft, Globe, as an "authorized conversion and overhaul center," has contracts for the conversion of a quantity of C-47's into DC-3 commercial air carriers for such companies as Braniff Airways, American Airlines, Swedish Airlines and Hawaiian Airlines. Globe has been extended full technical aid, supervision, drawings, tools and the accumulated world-wide experience of the Douglas plant. When time and material preclude the possibility of securing a very necessary part of the DC-3 from the Douglas factory, Globe has been granted blanket approval to manufacture such part for installation on the airplanes undergoing conversion and have all patterns, tools, jigs, and blueprints needed to fabricate the part.

Douglas has set up six administrative groups to aid the associated companies in details of operational planning, licensees' accounts, quality control, tooling and equipment, data and records, shipments and procurement and specialized assistance. A Douglas resident representative at each center provides liaison with the home office.

Globe has a record of having built two airplanes of its own, both of which were certificated by the CAA, the outgrowth of which is the new GC-1A "Swift," an outstanding personal airplane.

With the advent of the war, the Army picked Globe to build twin-engine advanced trainers which rolled off their assembly line in record time, substantially ahead of schedule. This was followed by other contracts with the Army and with other aircraft companies such as Curtiss-Wright, Lockheed, Fairchild, and North American.

New Ignition System Fires Dirty Plugs To Reduce Hazards

A high frequency, low voltage aircraft ignition system which will fire spark plugs even when extremely fouled or dirty has been announced by P. R. Mallory, Inc., of Indianapolis, Ind., which claims far-reaching possibilities for the development.

"Fouled spark plugs need no longer be a serious menace to planes and pilots," the firm says, and the new system offers greater reliability at altitudes of 50,000 feet and above where conventional ignition tends to get out of control. The development, undertaken for the Army Air Forces, is said also to offer greater power output, longer spark plug life, reduction in radio interferences and weight reduction.

Here's how the system, which incorporates high frequency at the spark plug electrodes and low voltage generation and distribution, works: Low voltage of only 1,200 volts is generated in a magneto and distributed through shielded leads to the spark plug. At the manifold ring, the low frequency energy of the magneto is converted to high, or radio, frequency energy (2,000,000 to 3,000,000 cycles per second) by an impulse type converter. At the spark plug, the low tension high frequency energy is stepped up to a voltage sufficient to jump the spark plug electrodes (approximately 10,000 volts) by means of a special transformer hermetically sealed in the well of a standard aircraft spark plug.

The first successful Army flight test of the new system occurred at Vandalia, Ohio, on October 10, 1944, and at present it has a flight background of over 1,800 hours. Its application to small aircraft engines has not been thoroughly investigated and analyzed.

Continental Reveals New 2,100-hp. Aircraft Engine

Continental Aviation & Engineering Corp., a subsidiary of Continental Motors, has developed a heretofore unannounced aircraft engine known as the I-1430, a twelve-cylinder, sixty-degree inverted V type developing 2,100 horsepower and weighing only 1,640 pounds. It was designed and built by Continental Aviation & Engineering Corp., subsidiary of Continental Motors. The cylinders of the engine are individual instead of being cast en bloc, resulting in better cooling characteristics. The cylinders have two instead of four valves that are usual in this type engine. The I-1430 is built for use with turbo-supercharger.

15-Month Output Ordered at B-29 Engine Plant

The Army Air Forces has placed enough advance orders for B-29 Cyclone engines to Wright Aeronautical Corporation's Wood-Ridge plant to keep the plant in full production for at least the next fifteen months. The plant builds 2,200-horsepower Wright Cyclone 18 engines for the Superfortresses.

GE Jets for Navy

Jet propulsion aircraft engines are now being produced for the Navy, as well as the Army, by the General Electric Company. No other details were revealed.

B-26 Program Completed

The last B-26 Marauder has been produced and delivered to the Army Air Forces by Glenn L. Martin. It was the 5,266th B-26 to be built by the company.

ELECTRICITY, LIGHT AND AIR are conveniently furnished to Douglas Aircraft workers using this unique fluorescent light fixture inside C-54 fuselage. Base has air and electrical outlets making possible short hoses for rivet guns and short cords for electric motors. Five units are used in each fuselage and may be connected in series.

Kansas Plant Delivers 6000th B-25 Bomber

The Kansas City plant of North American Aviation, Inc., has produced its 6,000th B-25 Mitchell bomber, and it was announced that the factory had met its bomber schedule for eighteen consecutive months. At the same time extensive tooling and planning for the jet-propelled Lockheed P-80 fighter for the Army Air Forces are being pushed ahead at the Kansas City factory. Work on the jet fighter is in various stages of pattern work.

Luscombe Production Doubled in First Quarter

Luscombe Airplane Corporation, Trenton, N. J., doubled its sales and production of all-metal precision components for combat and military transport aircraft during the first quarter of 1945 over the same period of 1944. Now delivering war materials at the highest rate in its history, Luscombe sales amounted to $1,937,594.00 in the first quarter of this year, according to Leopold H. P. Klotz, Luscombe president.

Packard Organizing Postwar Aircraft Engine Program

G. H. Brodie has been appointed assistant to the president in charge of special design projects of the Packard Motor Car Company to initially organize special postwar aircraft and marine engine programs planned by Packard.

Girdler Leaves Convair

Tom M. Girdler, chairman of the board of Consolidated Vultee Aircraft Corporation, has resigned as chairman and director after nearly three and one-half years. Girdler continues as chairman of the board of Republic Steel Corporation. He became chairman of the Consolidated and Vultee Corporations in December, 1941. The companies were later merged.

WPB Names Aircraft Industry Advisory Group

Formation of an aircraft manufacturers industry advisory committee was announced recently to assist the War Production Board in civil aviation planning.

Members are Ernest R. Breech, president, Bendix Aviation Corp.; Clayton J. Brukner, president, Waco Aircraft Co.; LaMotte T. Cohu, president, Northrop Aircraft, Inc.; Donald W. Douglas, president, Douglas Aircraft Co.; John W. Friedlander, president, Aeronca Aircraft Corp.; Robert E. Gross, president, Lockheed Aircraft Corp.; Leroy R. Grumman, president, Grumman Aircraft Engineering Corp.; Alfred Marchev, president, Republic Aviation Corp.; Glenn L. Martin, president, Glenn L. Martin Co.; William T. Piper, president, Piper Aircraft Corp.; T. Claude Ryan, president, Ryan Aeronautical Co.; Dwane L. Wallace, president, Cessna Aircraft Co.; J. Carlton Ward, Jr., president, Fairchild Engine & Airplane Corp.; L. A. Wells, president, Engineering & Research Corp.; Eugene E. Wilson, vice chairman, United Aircraft Corp.; Guy W. Vaughan, president, Curtiss-Wright Corp;, and C. L. Egtvedt, chairman, Boeing Airplane Co.

UNIVERSAL MIDGET AIRCRAFT ¼" SOCKET SET. DANDY 18-piece set: 8 sockets—7/32" to 7/16", Spintype Handle, Sliding T Bar Handle, Reversible Ratchet, Midget Crescent Wrench, 4 Midget Open-End Wrenches, 1 Midget Screwholder . . . $19.85. Order this new Aviation mechanics set now! IMMEDIATE SHIPMENT: Overnight by air to anywhere USA!

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Another Boeing Plant Converts to B-29 Work

Conversion of the Seattle Boeing Aircraft Company's Plant 2 from B-17's to the sole production of B-29's has been completed after about a year of in-process conversion. The plant turned out 100 B-17's a month during the last several months while converting jigs to B-29 production. With conversion completed, the Boeing Plant 2, the branch plants in six Washington cities and the Renton-Boeing factory are an integrated, single operation with Plant 2 and the branches building parts and major assemblies for the B-29 and the Renton plant assembling the completed bombers.

Detroit Gear Plans Postwar 'Copter Work

Postwar manufacture of helicopter transmissions and other aircraft gearing is planned by the Detroit Gear division of Borg-Warner Corp., now the nation's largest producer of helicopter gearing. The company engineered and manufactured the main transmission for the Army R-6 helicopter. Experience gained during war manufacture of helicopter gearing is expected to be put to use in the postwar period, according to company officials.

New Rubber Mounts for B-29 Engines

A B-29 Superfortress engine mount providing a weight saving of approximately thirty-six pounds per airplane and adding more than a hundred pounds to the bomb and fuel carrying capacity of each B-29 has been announced by the Goodyear Tire and Rubber Company. The saving per mount over current types of B-29 engine mounts is about one and one-half pounds, and each of the four engines has six mounts. Considering the ratio of airplane dead weight to total weight-carrying capacity, the new engine mount adds about 108 pounds to the bomb or fuel capacity. The mount features a cylindrical cushion of rubber which operates in conjunction with a ball joint. The combination results in the control of vibratory forces in all directions, eliminating the vibration as much as possible from each engine. The mount is produced and assembled by Goodyear in co-operation with the Goodyear Aircraft Corporation.

Bendix Radio Service Expanded

The Bendix Radio division of Bendix Aviation Corporation has expanded its West Coast quarters to provide complete shop facilities for assembly and production of various radio installations for aircraft and other applications, according to R. B. Moon, West Coast division manager. A complete line of Bendix Radio equipment and spare parts is stocked, and trained personnel is available for servicing and overhauling radio communications and navigation equipment.

NAA Sales Record

North American Aviation, Inc., in its annual report to stockholders, reported sales of $718,003,498 during 1944 and a net income, after all charges, of $8,389,967 for the fiscal year. In 1943 sales amounting to $509,139,549 and a consolidated net income of $6,790,323. During 1944 the company produced 121,700,000 airframe pounds compared to 109,000,000 pounds in the nine-year period from 1935 to 1943. By the end of the fiscal year ending September 30, 1944, North American had delivered 29,000 B-25 Mitchells, B-24 Liberators, P-51 Mustangs and AT-6 Texans, equal to 12½ per cent of all types airplanes produced in the United States from July 1, 1940.

Ryan Gets Martin Order

Ryan Aeronautical Company has received a new contract to design and manufacture $800,000 worth of a new type of exhaust manifold for the Glenn L. Martin Company. Production is to begin in August. Ryan's total backlog is now approximately $116,000,000. The company is at work on a $45,000,000 Navy contract, doubling the number of Ryan fighting planes to be manufactured.

Kollsman Outlook Bright

In an annual stockholders' meeting, F. W. Magin, president of Square D Company, stated that the aviation instrument division of the company, Kollsman, has good postwar prospects because there is little doubt that the United Nations will maintain air forces greater than has ever been in other times of peace, and that the trend to larger aircraft means the use of more aerial navigation instruments. Large ships will need double or triple the number of instruments, and the all-weather flying that will be standard after the war means a greater reliance upon precision instruments, Magin said.

Pliobond Sales Agent Named

United States Plywood Corporation has been appointed exclusive nationwide sales agent for Pliobond, universal synthetic adhesive cement, by its developer and manufacturer, the Goodyear Tire and Rubber Company. Pliobond will be marketed through U. S. Plywood's twenty distributing units throughout the country. The new product is the first all-purpose adhesive which makes possible bonding together materials which have never before been bonded, and at the same time it is easy to use. It is liquid, and a bond can be achieved with either hot or cold application and without high pressure.

This year we've got to make 2=3! We've got to lend Uncle Sam in 2 chunks almost as much as we lent last year in 3. Which means that, in the approaching 7th War Loan, each of us is expected to buy a BIGGER share of extra bonds.

The 27 million smart Americans on the Payroll Savings Plan are getting a head-start! Starting right now they are boosting their allotments for April, May and June—so that they can buy more bonds, spread buying over more pay checks.

Our Marines went over-the-top at Iwo Jima in the greatest, and hardest, battle in the Corps' history. Now it's your turn! Your quota in the 7th is needed to help finish this war, sidetrack inflation and build for future prosperity. So, captains of industry, plant your flag on top—like the Marines at Iwo Jima!

CAPTAINS OF INDUSTRY—here's your CHECK LIST for a successful plant drive:

- ★ Get your copy of the "7th War Loan Company Quotas" from your local War Finance Chairman. Study it!
- ★ Determine your quota in E Bonds—the backbone of every War Loan.
- ★ Arrange for plant wide showings of "Mr. and Mrs. America"—the new Treasury film.
- ★ Distribute "How to Get There"—a new War Finance Division booklet explaining the benefits of War Bonds.
- ★ Circulate envelopes for safekeeping of bonds.
- ★ Display 7th War Loan posters at strategic points.
- ★ And—see that a bench-to-bench, office-to-office 7th War Loan canvass is made.

The Treasury Department acknowledges with appreciation the publication of this message

Southern Flight

This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council ★

NEW PRODUCTS

New Rivnut for Plastics

A new Rivnut of the splined type suitable for use in wood, plastics, leather, hard rubber or other material where it is necessary to anchor firmly a nut for attaching accessories has been announced by The B. F. Goodrich Company. Splines beneath the countersunk head supply resistance to torque while the bulge which forms below the end of the splines furnishes the tension resistance. The splined Rivnut can be installed with the same tools used for heading conventional types of Rivnuts in metal.

New Equipment for Hydraulics

A new, complete line of equipment for 3000 PSI hydraulic systems has been announced by Pacific division, Bendix Aviation Corporation. Twenty units are now in production. These include 5-in., 7½-in. and 10-in. pressure actuators, five sizes of check valves, actuating cylinders, electric operated 4-way selector valve, and other products. All of the units incorporate the same basic principles of design and construction that have resulted in Pacific division's 1500 PSI equipment being universally accepted and used in industry.

Special High Sensitivity Resistor

The G. M. Giannini & Company, Inc., has developed Autoflight high sensitive resistors. The unit has an overall dimension of 1¼-in. by 1⅛-in. diameter, producing a variable electric resistance from a low torque rotational movement. It can be connected directly to sensitive low torque apparatus such as aircraft flight test recording instruments, and will operate relays or recording systems without the use of amplifiers. Autoflight simplifies the delicate circuit measurements, and is useful in laboratory or industrial applications where photo-electric cell amplifiers were before required. It is obtainable in various types from 100 to 1,500 ohms, and from four to fifteen watts.

Sprayer for Engine Storage

The Airplane Manufacturing & Supply division of Pacific Airmotive Corporation has developed a Model PA 787 Aircraft Engine Preparer, used in preparing aircraft engines for storage by introducing a fine spray of oil into the inside of a completely assembled engine. The oil is heated by an immersion heater. The unit, portable and mounted on casters, requires a working pressure of thirty pounds of air. Information on request.

Countersink Has Larger Skirt

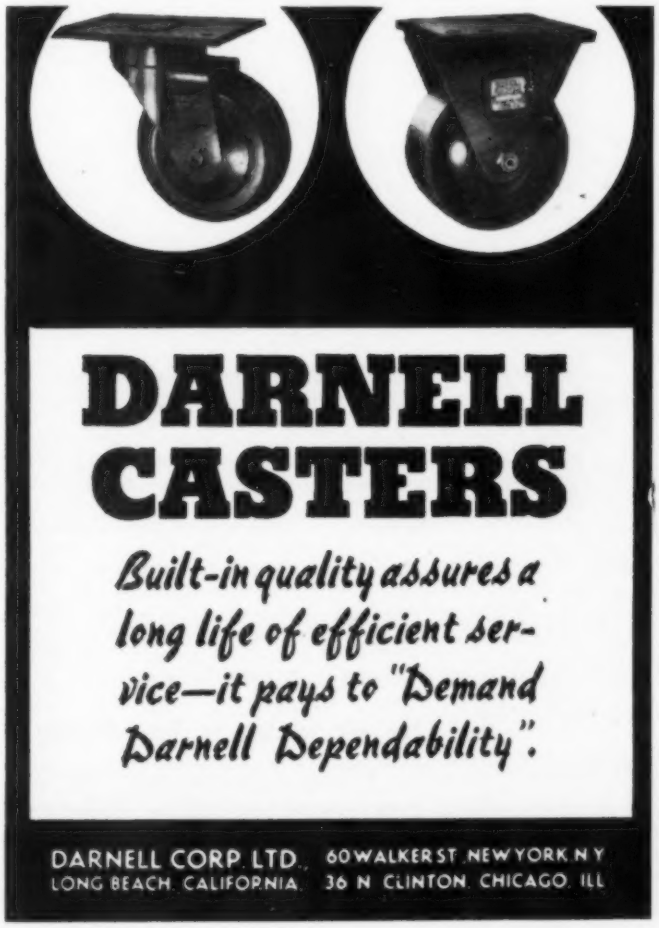
A new micro-set stop countersink with large bell skirt has been announced by Aircraft Tools, Inc., Los Angeles. The new model, designed as AT-400-B, has positive micrometer adjustment. It is compact and lightweight, and is precision made from high-speed tool steel. Concentricity of shaft, pilot and cutter limits is held to close tolerances. Polished flutes eliminate chips at high speeds, and give chatterless performance. All parts are interchangeable, and replaceable cutters and pilots are available from stock.

Propeller Trouble Detecting Device

Detecting defects and bugs in a few seconds, a new trouble shooting device developed by the Glenn L. Martin Company, makes it possible to check the complete circuit of an electric propeller with engine running, the company said. The Martin Electro-Troubleshooter consists of a small fibre box mounting four lights hooked up; the multiple-purpose circuit can be plugged into the propeller electrical system either forward or aft of the prop relay box, or into the governor to provide three separate sets of checks. When plugged in ahead of the relay box, one light checks the automatic circuit, a second increases manual and a third decreases manual. Plugged in after, one light indicates proper functioning of increase manual and a second that of decrease automatic. Hooked into the governor circuit, one light burns constantly while automatic and two others flick on and off as the governor points open and close in decrease and increase. Only four lights are said to be needed to give a complete check of the whole propeller electrical system.

New Abrasive Blast Tables

A new line of Wheelabrator Swing Tables is being manufactured by American Foundry Equipment Company. The table, which utilizes the Wheelabrator airless abrasive blasting unit, extends the speed and economy of airless blast cleaning to a wide range of intricate or irregular shaped work formerly cleaned in air blast rooms. Four sizes of blast cleaning units are available with sizes of the single work table being 24-in., 66-in., 72-in. and 86-in. in diameter. Operation of the four units is essentially the same. Work to be cleaned is placed upon a rubber-covered work table, mounted on the door of the blast cabinet. All blast cleaning operations are within the cabinet; the operator is never exposed to the abrasive blast or dusty conditions inherent in air blast room cleaning.



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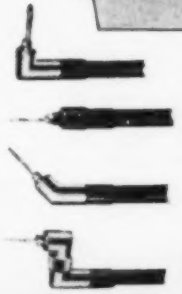

Here's the ever-ready answer to those jobs out on the field—jobs that require drilling equipment equal to production line tools. The Terry N-6-X Flexible Angle Drilling Field Kit can be readily carried to the plane. The sturdy wood case (31½" overall length) includes straight, flexible drilling unit plus geared shaft assemblies for use with any of angle heads shown to the left; also assorted drills mounted in adapters. Plenty of room in the case for additional equipment. Full details on request.

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CAB ASKS U. S. STATUTE TO LIMIT STATE AVIATION TAXES

By E. H. PICKERING

The Civil Aeronautics Board has reported to Congress urging congressional action to guard air transportation against multiple state taxation. The report followed a nine-month investigation directed by Congress last July, and was instigated by the Northwest Airlines case in which justices of the Supreme Court suggested that Congress should give attention to the multiple taxation problem. This was the case in which Minnesota had taxed the entire fleet of Northwest Airlines' planes to its full value, regardless of the fact that six of the other seven states in which the airline operated had also taxed a portion of the same fleet of planes.

Board Member Oswald Ryan supervised the investigation with the assistance of state, federal, and local tax officials, airline and Airline Pilot Association heads. The gist of the recommendation is that a federal statute should establish a balanced apportionment among the states into which an airline's operations are conducted. Administration of the details under the statute would be handled by some existing federal agency.

Secondary points brought out covered criticism of state taxation of fuel used in interstate commerce as being an impediment in the development of air transportation, and urged discontinuance of multiple taxation of flight personnel under state income tax laws.

It was pointed out by the Board that the field of multiple taxation was broader than the single subject of aviation, and it was recommended that the Treasury Department should make a further study of the entire subject.

The Board's report in general should please the air transport industry, which has been justifiably worried over developments in the Minnesota-Northwest Airlines case. The Board's report, if acted upon favorably by Congress, would be the first step toward settlement of the problem.

What Benefits from War?

The airlines have done an impressively tremendous job in the war to date. But what, in turn, have the airlines gained beneficially from the war? Principally, they have gained knowledge—knowledge of over-water, long-range, and foreign operations that would have been prohibitively costly as even a long term development in peacetime. They will have available, at the end of the war, a surplus of trained, seasoned, air transport veterans, well experienced in the above types of operations. This is their biggest operational gain.

From the standpoint of equipment, they will not be much better off immediately after the war than before. At that time, the Curtiss CW-20, and the Douglas DC-4 were already on order by many airlines. Their development had reached the flight-stage point, and by this time, many of these models would probably have been in use. The Lockheed Constellation project was under way. Only the super-planes of the Boeing C-97 and Consolidated Model 37 had not been seriously considered. The government's share of the cost of the development of these two models will lower the eventual cost to air transport users, yet at this writing, neither of these planes is apt to be available in quantities for airline use within the next two years, regardless of when the war may end. So it would seem that the only advantage to the airlines, from the standpoint of equipment, is experience gained in the use of new planes.

Plea to Planners

The airplane will create new traffic after the war. This fact should be a guide in all considerations of airline, Federal, state and municipal planning. There is too much of a tendency on the part of planners to accept prewar air and steamship traffic volumes as a criterion of future air commerce. It is no more apt to compare prewar travel and transport with postwar traffic than it would be to compare steamship volume with that of sailing ship days. History has shown that with each advance in transportation, new markets and new attractions increase national and international commerce. Failure to recognize this fact may retard commercial air development, given such a tremendous impetus by research and development during the war.

—GLENN L. MARTIN.

Operational practices have advanced rapidly in some cases, and have probably moved the safety feature several years ahead of comparable peacetime development. Particularly is this true in communications, for radar, and instrument landing, will have a powerful effect on airline safety and dependability.

The effect on the public mind toward acceptance of air travel will probably increase postwar air travel to a point well beyond a normal peacetime growth, which, in the long run, may prove the biggest single blessing of the war to the airlines. It seems likely that at least three million people have flown who, under normal conditions, might not have had occasion to break their normal antipathy toward flight. Once beyond that initial hesitation, they can be looked upon as potential air travelers whenever travel is necessary for them.

Air Pick-up Expansion

On May 12th, airmail pick-up service will be six years old. To date, all operations under the system have been conducted by All American Aviation, Inc. According to Hal Bazley, All American president, expansion has increased from 1,040 miles to 1,568, the number of communities served from fifty-six to 118. Midway in its history, the service moved out of the subsidy class, and last year brought in revenue of nearly two million dollars as compared with mail pay for the services of slightly over one-half million. Total revenue for the six years exceeds mail pay by nearly one and a half million dollars.

Almost concurrent with the birthday announcement came All American's notice of application for ten additional pick-up routes serving 203 additional cities in Pennsylvania, New Jersey, New York, Maryland, Delaware, West Virginia and Ohio. This increases the total route-miles applied for to 20,064, the number of communities to be served to 1,321 in twenty-four states.

Here and There

Delta Airlines has had a 65 per cent increase in passengers carried during the first quarter of this year over the same period last year. Additional planes returned from military service made the increase possible. The load factor dropped from 91.6 per cent in March of last year to 81.8 per cent in March of this year. . . . Continental Air Lines has combined the reservations, passenger service, station service, hostess service, and food service department into a new "flight service department", to be headed by Lynn Dennis, recently discharged from the Navy. . . . Latest United Air Lines figures indicate that company has as many as thirty-eight planes in the air during peak periods of the day, and never less than twenty-five at any one time. A 50 per cent increase in daily usage of the planes since prewar days is also announced. . .

April marked the nineteenth anniversary of Western Air Lines, and May will mark the fifteenth anniversary of stewardess service by the airlines, inaugurated May 15, 1930, by United Air Lines. . . . Civil Aeronautics Board has approved the application of Essair and W. F. Long for interlocking relationship, which would permit Long to act as president and chairman of the board of Essair, as president and director of Dallas Aviation School, Inc., owner of Dallas Aviation School & Air College, and as a partner in Terrell Aviation School, Ltd. A proviso was included calling for the filing with the Board of any contracts or agreements involving payments in money or services exceeding $200 in any one transaction, or $1,000 in any one year.

Rate Cut Opposition Explained

In the annual report to stockholders of Eastern Air Lines, a discussion of the Civil Aeronautics Board's show-cause order calling for a 50 per cent reduction in mail pay, sums up the attitude of the four major airlines concerning the proposed reduction. The airline claims there has been no change in conditions since 1942, when the Board set the present 60-cents per ton-mile figure. The report indicates Post Office Department profit of $3,000,000 in 1943 from Eastern Air Lines' mail operations. A broad expansion program now being planned would be jeopardized, as would the transition period of operations in the change-over to peacetime operations. The 60-cent-per-ton-mile rate is already lower than that of other airlines, it is claimed. The effect of such a reduction based on profits now being shown would act to kill the incentive toward economy and efficiency, the airline maintains.

A recapitulation of postwar equipment plans shows Eastern has negotiated "protective" contracts for ten Curtiss CW-20's, of thirty-eight-passenger capacity, eight Douglas DC-4's of sixty-two-passenger capacity, and fourteen Lockheed "Constellations" to carry fifty passengers in deluxe express-type service.

"Cruising Turbo" Forecast for Airline Operation

Commercial aircraft equipped with turbo-supercharged engines were forecast for postwar aviation by F. W. Disch, powerplant and turbo supercharger engineer for the Boeing Aircraft Company, at a meeting of the Society of Automotive Engineers in New York last month. Disch said that a cruising turbo, a small compact unit, would undoubtedly provide even greater engine efficiency and act as the transition type between the existing engines of today's airplanes and the utilization of turbine engines on the planes of tomorrow.

No Accidents in Test Flying

Flight crews at the Louisville plant of Consolidated Vultee Aircraft Corporation have flown more than 377,825 miles in approximately 2,200 hours to flight-test B-24's and other war planes since September, 1942. There has not been a crack-up and not one crew member has ever received so much as a scratch in all of this flying.

PERSONALS

C. W. FREITAG, one of the nation's best known salesmen of personal planes, has been appointed regional representative on Consolidated Vultee Aircraft Corporation's sales staff, and will be stationed at the Stinson division at Wayne, Mich. . . . DR. CHARLES ALLEN THOMAS has been elected vice president of Monsanto Chemical Company after serving as director of the central research laboratories for Monsanto . . . D. ROY SHOULTS, formerly engineer of the General Electric Company's Aviation division and one of the men principally engaged in the development of jet propulsion in this country, has joined the Bell Aircraft Corporation as vice president of sales . . . COL. N. JAY BOOTS has been elected chairman of the board and W. CHALMERS BURNS was elected president of Boots Aircraft Nut Corporation.

HARRY T. ROWLAND has been elected first vice president of The Glenn L. Martin Company . . . WAYNE WEISHAAR has been voted a new one-year contract by the directors of Aeronautical Training Society. . . GLENN E. CARTER, Western liaison supervisor for Aeronautical Training Society, has been appointed public relations officer of the Bank of America, Los Angeles . . . ROY B. BUCKLEY has been appointed executive vice president, DON P. MURDY, vice president and treasurer and HYMAN SMITH secretary of Timm Aircraft Corporation . . . KENNETH MacGRATH has been elected executive vice president of Air Associates, Inc. MacGrath was previously general manager of the Eclipse-Pioneer Division of Bendix Aviation Corp. . . . B. A. "BUD" GILLIES was elected a vice president of the Ryan Aeronautical Company, formerly being assistant to the president of Ryan . . . BRIG. GEN. GEORGE H. BEVERLY has been appointed commanding general of the San Antonio ATSC at Kelly Field, Texas.

ELMER R. CRANE has been made chief of the radio division, Lear, Incorporated, and WILLIAM J. PERFIELD has been appointed chief engineer of the mechanical division of Lear . . . R. S. BENTON has been named chief of the industrial relations department at the Miami division of Consolidated Vultee Aircraft Corp., succeeding E. W. Baker who resigned . . . JOHN E. P. MORGAN has been named executive director of the Aeronautical Chamber of Commerce of America, Inc., and JOHN K. BOYLE was named assistant director of the Chamber.

GEORGE S. HUNT, who designed interiors for the DC-3 and DST, has resigned from Douglas Aircraft Company to be associated in New York with Henry Dreyfus . . . E. E. ELLIOTT has been appointed a flight service engineer at Fairchild Airplane Corporation . . . C. E. (TUG) WHITE, former industrial engineer at Convair's New Orleans division, has been transferred to the company's Tucson division in the same capacity, and JAMES L. KELLEY, division manager of Convair's San Diego plant, will also serve as division manager of the company's Tucson plant . . . BENJAMIN W. TURNER has been appointed secretary and legal counsel of the J. P. Riddle Company.

Meyers Succeeds Knudsen as ATSC Commander

Lt. Gen. William S. Knudsen has returned to Washington, D. C., from Wright Field to again become War Department Director of Production. General Knudsen has completed his special assignment of organizing the Air Technical Service Command of the Army Air Forces, which he served as director during the organizational period and initial stages of operation. Maj. Gen. Bennett E. Meyers assumed command of the Air Technical Service Command.

Claire L. Barnes Heads Bendix Helicopters, Inc.

Claire L. Barnes, founder of the Houdaille-Hershey Corporation, has been elected chairman of the board of directors of Bendix Helicopters, Inc., filling the vacancy created by the recent death of Vincent Bendix. Robert J. Newhouse was elected chairman of the executive committee. Both Barnes and Newhouse have been members of the board of directors of the corporation. The election was announced after a meeting of the board last month.

Wright Researcher Wins Award for Cooling Fan

Kenneth Campbell

Kenneth Campbell, Research Engineer on advanced projects, Wright Aeronautical Corporation, has been awarded the Wright Brothers Medal by the Society of Automotive Engineers. The medal recognized as the best technical treatise on aerodynamics during 1944 Campbell's "Engine Cooling Fan Theory and Practice." The paper stated that mounting cooling fans on high-horsepower aircraft engines makes available as much as 200 additional horsepower per engine at high altitudes or in climbing. The fan permits the airplane to operate with its cowl flaps closed under many circumstances.

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CAR Revisions Will Become Effective July 1

Revisions in the Civil Aeronautics Regulations affecting private pilots will become effective July 1, according to the Civil Aeronautics Board. The Board has adopted Parts 20, 60, 43 and 49 as submitted by the Safety Bureau. Among the outstanding changes beginning July 1, will be: the minimum age limit for a private pilot will be 17; navigation and meteorology will be dropped from the written examination; ten hours dual instruction will be needed for a private certificate; and appropriate credit toward a powered aircraft rating will be given for glider time.

Douglas Official Sees 15-fold Increase in U. S. Air Passengers

Arthur E. Raymond, vice president in charge of engineering of the Douglas Aircraft Company, has projected his conception of an "adequate" airline system for the U. S., which would handle 58,000,000 passengers annually —fifteen times more than now—and require more than four times the number of planes used now. To fit his projected system, U. S. route mileage would have to be increased to 93,000 in the immediate postwar period from the present 37,000 miles, with most of the increase being in short haul operations. There would be 1,350 airline ground stations instead of 227 as of now, being separated by an average of fifty miles rather than the present separation of 123 miles. Passenger miles would increase almost twelve times under Raymond's ideal system, and rates should be 2.5 cents per mile instead of the present 4.5 cents.

NAA Elects Officers, Nine New Directors

The board of directors of the National Aeronautic Association has re-elected William R. Enyart as president and chairman of the board. Arthur I. Boreman, Des Moines, Iowa, was chosen first vice president; Sheldon B. Steers, Lansing, Mich., second vice president; Mrs. Nancy Harkness Love, Sherborn, Mass., secretary, and William P. Redding re-elected treasurer. The executive committee selected for the forthcoming year is composed of Enyart, Redding, Steers, Boreman, Richard C. Palmer, Washington, D. C.; R. C. Oertel, New York; and C. S. Jones, New York.

New members of the board of directors, announced at their meeting, are: Boreman, C. S. Jones, president, Casey School of Aeronautics; George E. Haddaway, Dallas, Texas, editor, *Southern Flight*,; Lt. Col. Jack Vilas, Chicago, Ill., president, Pyle-National Co.; William H. Ziegler, Minneapolis, Minn., president, William H. Ziegler Co.; Harry R. Playford, St. Petersburg, Fla., banker and sportsman pilot; Robert H. Wood, Washington, D. C., editor, *Aviation News;* and Robert L. Watkins, Omaha, Nebr., sales promotion manager, Eppley Hotels, Inc.

Aero Chamber Seeks Drastic Revisions Eliminating Airworthiness Design Requirements for Small Planes

Sweeping revisions in government airworthiness design requirements for personal aircraft have been recommended by the Aeronautical Chamber of Commerce to the Civil Aeronautics Board. The ACCA said its recommendations, which would permit the postwar flier a wider choice of aircraft types, represent a "basically new approach" to the problem of safety regulation of personal-type planes.

The industry would eliminate current minimum performance requirements (take-off distance, rate of climb, etc.), which now must be incorporated in all planes. The proposal would require instead that carefully determined data on essential flight characteristics be supplied to the pilot by the government and the manufacturer. The ACCA told the CAB it believes the manufacturer and the government should be jointly responsible for determining the aircraft performance and flight characteristics and for supplying the personal flier with information on operating limits.

Liberalization of existing regulations, it is believed by the industry, will serve to accelerate the development of improved designs and increase the utility of all postwar personal-type planes.

WAR STAMINA of U. S. pilots and planes is illustrated in these photos received by CAA Inspector Ed Gates of Shreveport, La., from his son, Jim (lower photo), an Army Air Forces P-47 pilot in Europe. Upper photo shows a Thunderbolt which returned safely after clipping off five feet of wing on a telephone pole while strafing. The pilot belly-landed at 280-mph. on his home field. Lower view shows Jim Gates in P-47 cockpit pointing to hole made by fragment of 20-mm. shell. Missile just missed his shoulder and ricocheted off headrest.

Col. Scott Returns to Humble Oil Company

Scotty

Colonel C. C. Scott has returned to Houston, Texas, to resume duties as head of the aviation section of the Humble Oil and Refining Company after serving in the Army Air Forces since 1940. Since that time he served as chief of aviation under Lt. Gen. Walter Krueger and later in the same capacity under Maj. Gen. George Strong. He also represented the Third Air Force on the war management board. His commands included that of the 77th Observation Group; William Northern Field, Tullahoma, Tenn.; DeRidder Army Air Field, Louisiana, and Dale Mabry Field, Tallahassee, Fla. He and Mrs. Scott were honored at a final parade and review at Tallahassee with the attendance of the Florida Governor and Major General Westside T. Larson, Third Air Force commander, and other distinguished officers. "Scotty", as he is known to countless friends, has accumulated over 9,000 hours in the air as a civilian and military pilot.

Aircraft Equipment Going to State Schools, Colleges

The Army Air Forces' Educational Division is making available aircraft equipment and material to non-profit educational institutions, according to the War Department. Equipment valued at approximately $16,815,000 has been turned over to the schools in almost every state in the last five months. Teams of personnel having past educational experience are to cover various states and to display and demonstrate equipment which is available. Every state superintendent of education will be asked to aid the AAF's representative in developing the itinerary and in making the initial contacts with central points. The plan has been approved by the U. S. Office of Education.

Luscombe Preparing Dallas Factory Site

The recently acquired 600-acre site of the Luscombe Airplane Corporation seven miles northeast of Dallas near Garland, Texas, is being prepared for early use by the Company. Farm buildings are being removed, trees uprooted and ground seeded with bermuda grass. A contract will be let in May for the construction of an all-metal hangar, first of a group of new buildings to be erected on the site. A downtown Dallas building has been leased at 1414 Camp St., where machinery is being installed for immediate production of war assemblies.

PENNSYLVANIA SQUADRON 32 OFFICERS met recently with Wing officers at York Airport, Thomasville, Pennsylvania. Pictured left to right are W/O Leo Feldman; Lt. Glenn Bailey, Group Intelligence Officer; Lt. Gilbert Dusman, Group Supply Officer; Capt. Jesse Jones, Group Executive Officer; Maj. Carl Reber, Wing Executive Officer; Capt. Oscar L. Hostetter, Squadron Commander; Capt. Samuel Fraim, Group Commander; Capt. Clarence Green; Lt. John Frank; Lt. Glenn Little; Lt. William White; Lt. Clyde Golden; Lt. Frank Walter; W/O David Myers; Lt. Jesse Shindler.

Five AAF Commands Direct CAP Projects; Wings Get AAF Officers

Far-reaching changes in Army Air Forces supervision over military activities of the Civil Air Patrol and co-operation with its civilian activities are being effected as the result of the transfer of national CAP headquarters from New York to Fort Worth, Texas, in the same building housing headquarters of the AAF Training Command, under which CAP now operates.

Lt. Gen. Barton K. Yount, AAFTC commanding general, has delegated supervision of CAP military activities to the Training Command's three flying commands and two technical commands, and an AAF officer is to be assigned to each CAP state wing to supervise CAP Cadet training and to act as liaison officer between the AAF and local CAP units.

Present activities authorized for the CAB by the AAF include search missions for lost Army aircraft, and providing practical ground and preflight instruction in aviation subjects to youths between the ages of fifteen and eighteen. CAP cadets, selected on a merit basis, will be permitted to visit AAF installations during the summer months for a maximum of two weeks to stimulate interest in aviation.

The five AAFTC training commands and the state CAP wings directly under their supervision are as follows:

Eastern Flying Training Command: Delaware, Maryland, West Virginia, Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Mississippi, Alabama, Georgia, and Florida.

Eastern Technical Training Command: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Ohio, Indiana, Illinois and Michigan.

Western Flying Training Command: Washington, Oregon, Idaho, California, Nevada and Utah.

Western Technical Training Command: Montana, Minnesota, North Dakota, South Dakota, Wyoming and Nebraska.

Central Flying Training Command: Wisconsin, Iowa, Colorado, Kansas, Missouri, Arizona, New Mexico, Oklahoma, Arkansas, Texas and Louisiana.

National CAP headquarters completed its move from New York into the AAFTC headquarters building during April. General Yount has written CAP wing commanders personally welcoming the CAP into his command. He stated: "It is our aim, through the many facilities of this Command and with the enthusiastic co-operation of all your members, to make Civil Air Patrol grow stronger in the important tasks which they are performing as an auxiliary of the Army Air Forces."

300 Army PT-17's Going to CAP Wings

Approximately 300 PT-17 trainers are expected to be allotted to CAP wings in the near future, with distribution based on success of the CAP Cadet recruitment and training programs in each state. Lt. Col. D. Harold Byrd, commanding the Texas Wing, said his state will receive fifteen of the 220-hp. Army biplanes. It has been using nine L-2 liaison planes.

CAP Wings Busy In Flood Emergencies

Called into action by Governor Ralph F. Gates, the Indiana Wing contributed greatly to flood relief work recently. River patrol was flown throughout the danger areas. Radio contact was maintained and aerial photographs from CAP planes were assembled to make maps of the endangered region for use in emergencies. Machinery and equipment were removed from buildings at Madison, and reconnaissance flights were made to spot stranded persons or livestock.

The Kentucky Wing was in close contact with units of the Indiana Wing, ready to lend assistance on call, and flew reconnaissance over Louisville.

The West Virginia Wing was mobilized at the request of the U. S. Engineers Office. It flew on reconnaissance and took aerial photos.

The Missouri Wing was alerted to perform any mission necessary during the floods.

Illinois Officers Get Schooling at AAF Base

Eighty-two officers of the Illinois Wing, CAP, recently attended a two-day schooling at Chanute Field where they removed all insignia of rank and went into the barracks as student officers. They worked around helicopters and other military equipment and were instructed in military subjects. The Michigan Wing is also planning an officers' school at an AAF installation.

Fourth California Group Commanded by Bowman

The California Wing has activated Group 4 in which are Oakland, Vallejo and Alameda Squadrons, under the command of Captain R. P. Bowman, CAP, who has been serving as Oakland commander. Lt. F. G. McElwain, who was in naval aviation in the last war, succeeded him as commander of the Oakland Squadron.

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BOOK REVIEWS

Air Power For Peace, *by Eugene E. Wilson, published by McGraw-Hill Book Company, 330 West 42nd St., New York 18, N. Y., price* $2.00.

This is the first sound appraisal of the true value of air power and its impact upon military and economic security.

Mr. Wilson's book touches the high spots of aviation history, reviews each major military action in the light of the new definitions of air power from our own and our enemy's viewpoints, and closes with a plea for a sound national air policy based on the new concept of air power and what it can accomplish to enhance our physical and economic security.

Fighters Up, *by Eric Friedheim and Samuel Taylor, published by MacCrae-Smith Company, Philadelphia, price* $2.50.

The records of the Eighth and Ninth Fighter Commands operating in the European theater have brought fame to their pilots and developed keen rivalry between the squadrons. This book gives the history of these commands from November 26, 1943, up to January, 1945.

In many instances the pilots tell the stories of their special missions, patrols and other assignments in their own words. The opinions of these pilots regarding their particular planes, also given in this book, should prove interesting to those on the home front who have a part in the production of these fighting aircraft.

Aviation Radio, *by Henry W. Roberts, published by William Morrow and Company, 425 Fourth Ave., New York 16, N. Y., price* $5.00.

This book covers the entire field of aviation radio and should be interesting and helpful to everyone connected with either radio or flying—pilots, engineers, laymen. Described and illustrated are fundamental principles, primary and advanced radio facilities, radio navigation, and the design and installation of radio apparatus.

The text is in simple, clear language. At the same time the material presented is so comprehensive and its treatment so thorough that it should be of value to the most experienced.

NEW LITERATURE

G. M. Giannini & Co., Inc., 161 *East California St., Pasadena 5, Calif.*, has published a two-color illustrated booklet describing the Autoflight Direction Indicator, High Sensitivity Resistors and Autoflight Bellows.

The Kinnear Manufacturing Company, 820 *Fields Ave., Columbus 16, Ohio,* has released a 40-page illustrated booklet giving details and specifications of their various types of rolling doors. Airplane hangar doors are among the types covered. Copies available upon request.

Owens-Corning Fiberglas Corporation, *Toledo 1, Ohio,* has issued an informative 24-page booklet describing the many uses of Fiberglas electrical insulation materials. Ask for Catalog No. EL44-7A.

The B. F. Goodrich Company, *Akron, Ohio,* has just published a new booklet on the natural and synthetic rubber adhesives manufactured by this company. Directions for the application of natural and synthetic rubber cements are included. Copies can be obtained upon request.

Jones Motorola Company, *Fairfield Ave., Stamford, Conn.*, has published Bulletin No. 44-1, describing four models of Jones individual-mount tachometers and the Jones multi-range portable hand tachometer. The bulletin includes prices, a section on use and operation, and general installation data.

Casey Jones School of Aeronautics, 1100 *Raymond Blvd., Newark 5, N. J.*, recently has released an attractive 32-page illustrated brochure describing their various aeronautical training courses designed to fit graduates for permanent positions in the aircraft industry. These courses are arranged so as to give credit for previous experience, and particular attention has been given to arranging courses that will be attractive to returning veterans.

Celanese Plastics Corp., 180 *Madison Ave., New York 16, N. Y.*, has published a new 136-page manual, comprehensively diagrammed, covering every phase of fabricating cellulosic thermoplastics. One complimentary copy will be sent to any executive who requests it on company letterhead. Others may purchase copies at $1.00 each. Address Department A.

Kelite Products, Inc., *Los Angeles 1, Calif.*, has issued a booklet describing the scientific process developed by their service engineers and research laboratories for preparing metal surfaces for low temperature silver brazing.

Five Eclipse Service Manuals Available

Eclipse-Pioneer Division of the Bendix Aviation Corporation has just released five excellent service manuals covering starters, generators, air pumps, solenoid relays and generator control panels. Profusely illustrated, the service manuals cover (1) Eclipse Series 43 Inertia and Direct Cranking Starters, (2) Eclipse Engine Driven DC Generators, (3) Eclipse Engine Driven Air Pumps, (4) Eclipse Solenoid Relays and (5) Eclipse Generator Control Panels.

Each manual has sections dealing with installation; operation; service, inspection, maintenance, lubrication; disassembly, cleaning, inspection, repair and reassembly; and test procedure.

In addition, a parts catalog is incorporated to facilitate the procurement of replacement parts. Exploded view drawings show the complete breakdown of all available parts and sub-assemblies.

Copies of the service manuals are available to aviation service and repair organizations from the Technical Data Section, Eclipse-Pioneer Division, Bendix Aviation Corporation, Teterboro, N. J.

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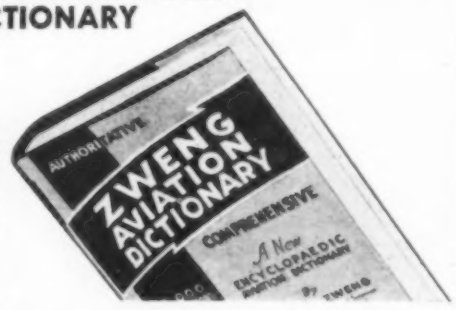

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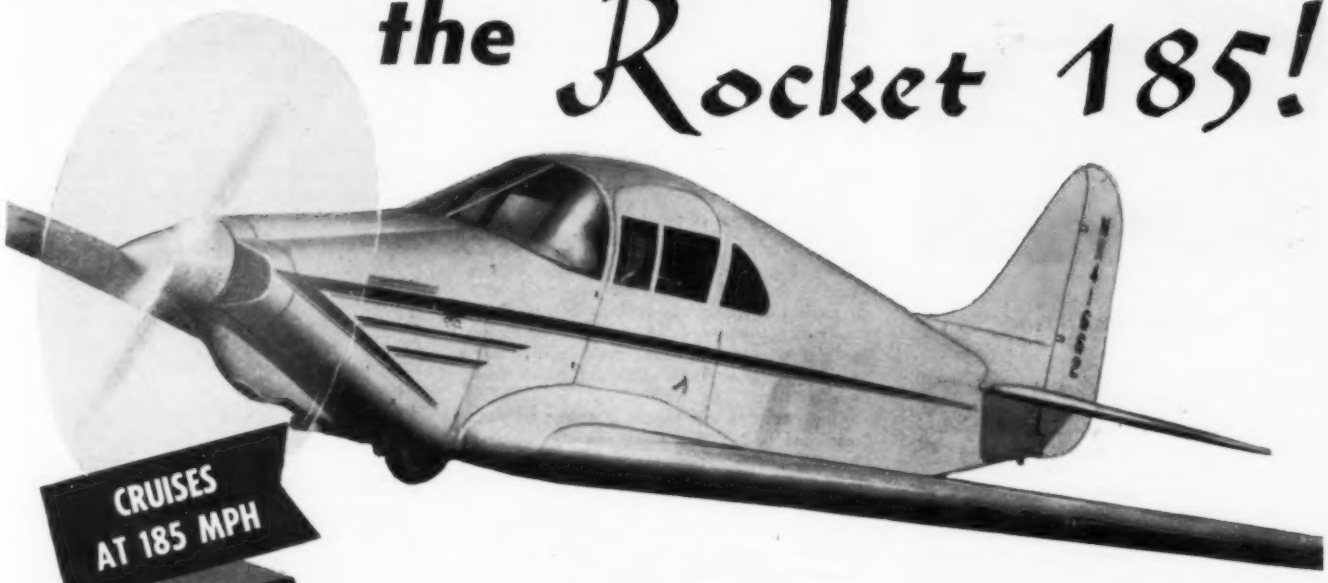

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By TONY HAGMANN

Los Angeles — *On Tour with Tony* . . . It's a "three blankets at nite" town complete with airports and little signs all over the lamp posts asking the voters to vote for airport bonds. There are huge nets over the aircraft plants which would come down "if we had time" and the Los Angeles Airport is invisible from the air . . . all stuck up with more camouflage . . . it is about a half a gas coupon distance from the Town House, as is the Burbank Airport. Burbank has the flying now and LA is gonna bid for it. Sounds like Dallas and Fort Worth, doesn't it? And the LA Airport is in Inglewood . . . to make it more so.

Sandal Dailey of the Texas Private Fliers Association and the *Dallas News* took her courage in hand and her very best bib and tucker and limped with us over Highways 80 and 90 to get here. We decided the airplane is a wonderful thing. Many of them passed over us every hour. We took a vote and were 100 per cent in favor of a billboard campaign to be started by the personal plane manufacturers to read: "It's just as pretty from the air—and much less time from here to there" . . . Corny, yes; but sound thinking. It took us three days driving and one night sleeping in a chair (because Big Spring was graduating aviation cadets and the hotels . . . yes, you know); two nights in tourist cabins and one bull steak, which was touted to us as filet, in Mexico . . . all of which could have been eliminated if we'd had a flying machine.

It is a good thing Los Angeles is not in Texas. The way it's spread out we'd have no room for the cattle, rabbits and sage and you have to know so many more people to get cigarettes. But man, we'd really have people for our airports. Of course they have airports here. By fast count we noticed eighteen ads with eighteen different airports mentioned and with charter service, instruction and planes for rent or sale and all that there stuff . . . and we understand there are hundreds of 'em.

So we started at North American Aviation to deliver messages from Lt. Commander Earl Chandler, and greetings from Texas. First we met Mrs. Virginia Agnew, who is a pretty young'un, got screened and badged. Then Edward J. Ryan, who hails from Florida, took us through the plant to the test pilots' work bench. We met R. C. "Bob" Chilton, who tests the experimental jobs and doubles for E. W. Virgin, chief test pilot for NAA here. Bob is a new QB and was very nice to us, showed us an airplane we'd like to purchase and you would too . . . every bit as nice as a pair of Justin boots, and just as impossible to get.

We met J. E. "Hi-boost" Barton who flies the well known "Joe's Baby", the P-51 with more engine in front than a puffed wheatie ever saw. We learned Roy Bodine was flying here, he usta be in Dallas, remember?

"The type of airplane North American will build after the war depends on what the market calls for," was the answer to our question on the subject . . . so there.

After fifteen dimes in the pay 'phone we finally got to talk to Jack Huff at the Lockheed flight office and we are going there tomorrow . . . And Sandal flew back to Big D via American . . . and the sun comes out every day at eleven after burning off the California fog . . . and if you come out here bring a heavy coat, a check book, cigarettes, an appetite ('cause the food is better than they tell you) and for gosh sakes come by plane.

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LARGEST AND HEAVIEST airplane tire ever produced in U. S. is this 110-in. giant built by Goodyear. Measuring 44 inches across the beads and 36 inches from one sidewall to another, the complete assembly of tire, tube and rim weighs 2,600 lbs. The tube alone weighs 250 lbs. Shown comparing a standard 6.00-16 auto tire with the new airplane wheel is President E. J. Thomas of Goodyear.

signs (this is a very signy country) saying Lockheed Terminal, Burbank. You find them on everything that doesn't move. Underneath are arrows which you follow and you arrive at the flight office talking to John Cody, who edits *Hangar Flying*. He sees to it you meet everybody, too.

There is a room where the best pilots in the world have been known to sit and play pitch waiting for the haze to get out of operation which is seldom. We met John Grimmett who asked us why Haddaway didn't return his coat. Seems long ago George and Lee Miles made a trip here and the coat got mixed up. We met Dick Field, who had a busted fist . . . no comment; Tommy Wilkinson wearing a fine pair of pure Texas boots; Tommy is from Abilene; Sammy Held, NY City but is "gonna stay here"; Hal Fryer, usta fly for Sparton, Tulsa; F. "Norm" Hansen, Minneapolis, said: "Yah, I know Danny Fowlie"; Charlie Flanagan, citizen of Los Angeles, no less; Joe Rampone, Trinidad, Colorado, and Al Gilhousen. Al is a QB as are most of these fast flyin' operators.

Other VIP with well worn wings included: Gil Waage; Ted Lungren; E. A. Jaquish known as the "Albuquerque Kid" and TWA'd out of Kansas City for years; John Schields who will go back to cotton dusting he said, and our old friend Freddy Dick. Freddy told us of Curry Sanders, also known as the "Mad Trapper," for a very funny reason, and Ken Hunter or "Beanie Boy" for short and Roy Dixon, ole "Fish Kicker." All are doing time at Lockheed's Navy Mod Center, in Van Nuys. Something to do with Pacific operations.

Furthermore we found all slick chicks do not come from Dallas. Witness Al Horning, who is a fine hello girl and unscrambles the phone calls for the pilots, and Mickey Murray, who catches for Joe Towle and Avery Black. Mickey we were informed was one of the first fems to draw a bag of pay dust from the company. Must've started right out of kindergarten. We peeked at lots of others who would be good material for talent scouts . . . but they ain't allowed inside the gate.

Here is a special paragraph for Joe Towle. He is respectfully called the "flying chief" by everybody. He spends his time up . . . up . . . up . . . and up. He is found under the heading of "Strictly a good guy" . . . a QB, of course.

We met E. J. Demas . . . the same who flew with the Byrd expedition at the South Pole—worked for Byrd-Frost, Dallas—drew a Love Field master plan in 1936 and accounts for himself in the world of aviation quite well. We gathered he is not in love with Texas . . . but Lockheed? Yes, yes.

Just as we arrived at Lockheed-Burbank (see how those signs affect you?) we saw everyone standing on barrels, boxes, roofs, cartops, P-38's and any thing thicker than a match stick, all looking up. A P-80 swooped over the field at more miles per hour than we can count with our shoes off and we were impressed but we don't know what we saw; it went too fast. Afterward we found this particular baby had been flown by the Clark Gable of Lockheed, known as "Fish" Salmon. Fish is a very neat pilot and we do mean neat. But we'll bet you the best cuppa coffee in town you'd think you were meeting Gable in 1935 when you meet him. He says "yeh, man."

While we were beating this out on a borrowed typewriter, Prentiss Cleaves dropped in, so did Bill Peale and we chatted a minute about boats, and the weather, which is under constant observation. Then ole Lee "Slow" Burns came by. He is vice president in charge of deep sea fishing; Jack Huff came bearing a package of (censored). We met Nick Nicholson and John F. Brumfield who asked us to deliver regards to Bill Long. Also Jim White from Vernon, Texas . . . Then the phone rang and it was George McEntire, an ex-Midland flier who tells everybody here how to catch giant Texas jack rabbits (we don't know, but were afraid to tell him so) . . . George said to tell our boss to jump in the ocean . . . any ocean, so we figger they are good friends. Ray Meskimen dropped in . . . he flew for United in Wyoming . . . and then ole "Tailspin"

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Tommy Wolfe told us how much he liked his passport and the day was about over. Everybody wants a passport . . . so we're having a gross sent out to Lockheed-Burbank. Drat those signs . . . all over the place . . . five will get you ten we dream about them all nite . . . but it will be pleasant like the rest of the day . . . thanks to everybody here. We are glad we paid our poll tax. We vote "Aye" for Lockheed.

Kansas City, Mo. — *by Marion Melcher.* Golly, you should see what Airway Flight Service did to a barracks building formerly the property of Missouri Aviation Institute when they were under Government contract for the training of enlisted mechanics. No more plain floors, double-deck bunks and barren walls. No sir! You'll find an office with beautiful furniture, walnut doors, shop space, classrooms, and (a sure sign this is not the army!) a powder room! They're located on the north end of Muny.

"Skyhopper" had its first flight from Fairfax municipal airport across the river a few days ago. Gene Salvay's basement was the birthplace for the little eighteen-foot fuselage, twenty-five-foot wings and four-cylinder fifty-hp. Continental job. George Stark was his partner in building the plane. It took about three months to ready the little fellow for a successful first hop.

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SOUTHWEST . . . SERVING AVIATION SINCE 1925 IN THE . . . SOUTHWEST

As long as we're over at Fairfax, might as well add that the field has been deactivated as a ferrying unit. The 33rd ferrying group has virtually taken off for the four winds. The Ready Room, furnished by the WNAA in town, remains as is for they've been told that newcomers will welcome it.

Thirty-five young men from Latin American countries recently arrived to begin a year's training under the supervision of the Inter-American aviation training section of the CAA. This is the second contingent, and it's a good go for the boys. They are sponsored before coming to study here and have the assurance of a job in aviation on returning to the native land. Students are housed on the campus of the University of Kansas City.

Among the visitors at the dinner meeting of the Kansas City Unit of the Women's National Aeronautical Association, and witnessing the installation of new officers were Mrs. Ceylon Lewis of Oklahoma City and Mrs. Dorothy Gish of Tulsa, both members of the respective WNAA units in Oklahoma. And if you think a hundred women (by count) aren't interested in the modern jet-propelled plane, ask Mr. Thomas Schooley of North American for the right answer. He was speaker of the evening, and was kept whizzing!

OOhhee! here it is raining and blowing and all of us checking Old Man Ribber to see he controls himself!

Dallas—*Vida Foster*—Some of our best flying people turned out for the April 12 meeting of the Dallas Chapter, TPFA, at the Dreyfuss Club on White Rock Lake. News of the death of President Roosevelt a couple of hours before meetin' time accounted for the absence of many who had planned to attend. However, Weldon Williams was stuck with twenty-five pounds of the best barbecue we ever ate—and we were hungry. The pickles and 'tater chips were good—not to mention the onions (except under your breath). Fleming Waters' idea of something to wash the food down with, we learned, accounts for all that beer. President B. Jay Anthis thought it was a very good idea. Mary Royse took time out to find six dozen glasses for the "cracked ice and stuff" before flying to New York next morning. Jean and Lou Foote backed up George Clay's arguments in favor of a private flying club—TPFA'ers not excluded. George Haddaway entertained us loudly at table with song, accompanied by Fleming Waters, who let him down at the crucial moment. Howard Smith and George Jalonick wore sport shirts, Texas style. Bill Campbell

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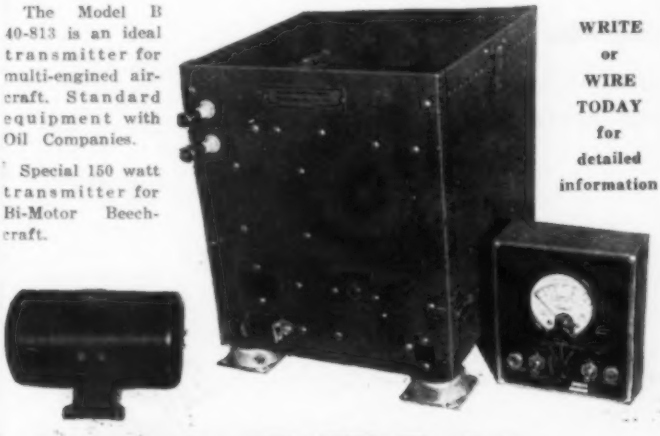

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enjoyed himself, quietly, as usual. Southwest Airmotive boasted the largest company attendance with Paul Kennedy, E. E. Chapman and Jack Lake, and brought out-of-town visitors Jimmie Matthews, Mr. Peterson and Stump Cline of the Le Tourneau Company. Others from foreign parts were Donald A. Duff of Continental Airlines, Denver, and Ralph McClarren, Franklin Institute, Philadelphia. New Member Jack Booth told us all about his new heliostadt and B. K. Dosterschill talked of purchasing a PT-17. Hugh Carlisle needed a special invitation. We had nice fun and see ya'll in Waco May 6 at the giant aviation rally.

Oklahoma City . . . Fred Bartholomew is the new president of the Oklahoma City Aviation Club, Keith Kahle, vice president, and Mrs. Clayton Johnson, secretary-treasurer. . . . The club is especially interested in the development of private flying . . . The club's board of directors include John H. Q. Burke, Lloyd Catlin, Earl Henry and Moss Patterson. The airport development committee is headed by R. W. Thomas, and assisting the local engineer are Hope Biggers, Clayton D. Johnson and James Eagleton.

Fairchild Changes C-82 Engines to 2,100-Hp. Type

New double Wasp engines rated at 2,100 take-off power are being installed in production models of the Fairchild C-82 Packet, replacing those in the prototype. The engines are of increased military and normal power ratings at altitude and are the most powerful Pratt & Whitney aircraft engines in use on a production airplane, incorporating provision for water injection equipment to give extra emergency power.

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